Otto Bock®

QUALITY FOR LIFE

B600
Service Manual

GB
USA

B600 Power Wheelchair Service Instructions

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1 General Information

1.1 Foreword

These service instructions describe all regular maintenance tasks as well as repair and replacement tasks for the B600 from Otto Bock Mobility Solutions GmbH. They include all information required by dealers in order to correct functional and mechanical defects on components of the B600.

The information in these service instructions is essential in order to work on the B600 correctly and safely. This is why this document, in particular the section “Safety Instructions”, must be read carefully by all persons working on the B600. This ensures the functionality of the B600 is fully utilised.

1.2 Intended Use

The B600 power wheelchair is intended for indoor and outdoor individual self-transportation by persons with limited mobility. The B600 power wheelchair may only be used by persons who have the required physical and mental capabilities.

Any other use is considered improper use. The manufacturer is not liable for any personal injury or damage to property resulting from improper use; in such cases, the user has sole liability.

The B600 power wheelchair may only be used by properly trained persons. Training is one of the prerequisites in order to protect against personal risks and to operate the B600 power wheelchair safely and properly.

2 Safety Instructions

2.1 Explanation of Symbols

⚠ WARNING	Warnings regarding possible risks of severe accident or injury.
⚠ CAUTION	Warnings regarding possible risks of accident or injury.
NOTICE	Warnings regarding possible technical damage.
INFORMATION	Information regarding operation. Information for service personnel.

2.2 Standards and Directives

All safety information contained in these service instructions refers to the currently valid national laws and regulations of the European Union. In other countries, compliance with the applicable laws and national regulations is required.

In addition to the safety instructions contained in these service instructions, the user is required to observe and comply with the BGV (Employer's Liability Insurance Association regulations), UVV (accident prevention regulations) and environmental protection regulations. All information contained in these service instructions must be complied with at all times without restrictions.

The B600 power wheelchair has been constructed in accordance with state-of-the-art technology and is safe to operate. The safety of the B600 power wheelchair is confirmed by the CE symbol and the declaration of conformity.

2.3 General Safety Instructions

INFORMATION

Regular maintenance is important – it improves safety and increases the lifespan of the product.

⚠ CAUTION

Risk of suffocation. Packaging materials must be kept out of reach of children.

NOTICE

Risk of damage due to unauthorised service. Service and maintenance tasks may only be completed by properly trained authorised personnel. Use only original spare parts for all service and maintenance tasks.

NOTICE

Risk of damage caused by failure to comply with maintenance intervals. Otto Bock recommends having the B600 power wheelchair inspected and maintained for functionality and operational safety by authorised personnel at least once a year. In case of frequent user changes (growing children or youths) or users with changing clinical pictures, the wheelchair should be inspected, adjusted and maintained twice a year.

NOTICE

Risk of damage caused by failure to comply with the service documentation. Familiarity with the service instructions and the instructions for use is essential for proper service.
The service and maintenance instructions must be read carefully before commencing work. The service instructions apply in conjunction with the instructions for use and the spare parts catalogue. All documents must be used together.
All safety instructions contained in these service instructions and all other applicable documents must be observed and complied with. They must be available to service and maintenance personnel at all times.

NOTICE

Risk of damage due to excessive heat or cold. The B600 may only be operated in the temperature range from -25 °C to +50 °C. It must not be operated at temperatures outside this range.

NOTICE

Risk of damage caused by overload. The maximum load capacity for the B600 power wheelchair is 120 kg (optional 180 kg).

INFORMATION

Familiarise yourself with the functions of the product. If you are not familiar with the product, read the instructions for use prior to inspection. The instructions for use are available from the manufacturer (see overview of all Otto Bock subsidiaries under “Otto Bock Worldwide”). Additional documentation can be downloaded from the homepage of Otto Bock at www.ottobock.de or www.ottobock.com.

2.4 Safety Instructions for the Use of Tools and Accessories

⚠ CAUTION

Risk of health impairment due to the use of incorrect tools. When completing the tasks, only use tools that are suitable for the conditions at the place of work and for which safety and the protection of health are assured with proper use.
Verify proper functionality before use. In the use of tools and supplies, also consider the ergonomic relationships between the place of work, tools and supplies, workplace organisation, workflow and tasks; this is particularly important in regards to posture during the use of tools and supplies.

⚠ CAUTION

Risk of health impairment due to the use of improper work clothing. Ensure legally prescribed protective work clothing is worn.

⚠ CAUTION

Risk of injury during tasks that involve lifting. When repair and maintenance tasks must be completed under raised parts or equipment, ensure suitable precautions are taken to secure the applicable components against falling. Equipment used to raise loads must prevent the load from accidentally shifting in a dangerous manner, dropping in free fall or being accidentally released.
When using lifting platforms, ensure that the B600 power wheelchair is centred on the platform and no parts such as the anti-tipper project into the danger area.

⚠ CAUTION

Risk due to hazardous materials. Hazardous materials may only be kept at the place of work in quantities required for ongoing tasks. Regularly and safely remove waste and residue. Clean up spilled substances immediately.

2.5 Safety Instructions for Maintenance Tasks

⚠ CAUTION

Risk of injury due to pinch points. For design reasons, there are pinch points between the seat and frame of the B600. Special caution is required during all work on the corresponding components.

⚠ CAUTION

Hazards while working on the brake system. Note that there is no braking functionality when the brake is unlocked. The brake must only be unlocked in hazardous situations and for maintenance or repairs. The corresponding force required for acceleration and deceleration must come from the person pushing. Once push mode is no longer needed, the brake release lever must be locked immediately.

NOTICE

Risk of damage due to improper preparation of maintenance tasks.

- The B600 power wheelchair must be turned off and the fuse must be removed for all maintenance tasks. This does not apply to functional tests of the electrical components.
- Secure the product to prevent it from tipping over or falling, e.g. off the workbench.
- Some components of the power wheelchair, e.g. the batteries, frame, seat and motors, are very heavy. Hoisting devices of sufficient capacity must be used where applicable.
- Clean / disinfect the product before you start the inspection. Consult the instructions for use regarding product care or product-specific inspection information.

NOTICE

Risk of damage due to unsecured screw connections. Unsecured screw connections can become loose while using the product. Secure screws and nuts. The screw connections must be tightened properly after all installation tasks. Defined torque specifications must be followed.
The screws and nuts for many of the screw connections are equipped with thread lock. If you have to undo such screw connections, the nuts or screws must be replaced with new ones equipped with thread lock. If new screws or nuts with thread lock are not available, apply a medium-strength liquid thread lock substance (such as Loctite® 241 or Euro Lock A24.20) to the existing screws.

NOTICE

Risk of upholstery damage. During any work on the seat, the upholstery must be adequately protected against mechanical and chemical damage. The back rest and seat bottom are flame retardant but nevertheless flammable. They must not come into contact with open flame or embers.

NOTICE

Risk of damage due to improper cleaning after the completion of maintenance tasks. The B600 may not be cleaned with a jet of water or a pressure washer under any circumstances. A cloth or sponge may be used for cleaning. Water must not come into direct contact with the motor under any circumstances.
Check the operating performance of the B600 power wheelchair after cleaning.

INFORMATION

The tyres of the B600 power wheelchair contain chemical substances that may react with other chemical substances (e.g. cleaning agents, acids etc.).

2.6 Safety Instructions for Maintenance Tasks on Electrical Components

NOTICE

Risk of damage due to improper preparation of maintenance tasks.
- If the driving function is not required, turn off the control unit or jack up the drive wheels in order to prevent uncontrolled operation through accidental joystick activation.
- Water must not come into direct contact with the electronics or battery during maintenance tasks.
- When attaching plug connections on the controller, ensure the contacts are assigned correctly.

⚠ CAUTION

Risk of injury while working on the battery. Only use a battery charger supplied by Otto Bock which has been tested and approved for the respective batteries by Otto Bock (observe information on the charger). Failure to do so can result in a battery explosion and possible impairment of health due to contact with battery acid.
Smoking and open flame are prohibited while working on the battery. Sparks must be avoided.
Explosive gases can develop while the batteries are charging. Observe the safety information provided by the battery manufacturer. Wear protective goggles. Ensure sufficient ventilation is provided when charging the batteries in an enclosed room.
Drive batteries can supply very large amounts of energy and may arc if they are short-circuited. Therefore, always disconnect the batteries when working on the motor controls or wiring.

NOTICE

Risk of battery damage. In order to prevent short circuits, always use insulated tools when working on the batteries.
Prevent deep discharge of the batteries in order to avoid loss of functionality and permanent battery damage.
Ensure correct polarity is used when connecting the batteries.

NOTICE

Risk of damage to the battery charger. Prevent overheating of the charger during the charging process. Ensure that the cooling ribs on the back of the device are not covered.

INFORMATION

The B600 has been tested according to EMC regulations. The following particularities must be observed during operation and communicated to the user:

- The driving characteristics of the B600 can be affected by electromagnetic fields (mobile phones or other radiating devices). Therefore all mobile devices must be turned off when driving.
- The B600 can generate electromagnetic fields that can cause interference for other devices. Therefore, turn off the control unit whenever you do not need it.

INFORMATION

During extended periods of disuse or shipment of the B600 power wheelchair, remove the fuse from the battery case in order to prevent deep discharge of the batteries due to standby consumption.

2.7 Safety Instructions for Disposal

INFORMATION

If the power wheelchair is no longer in use, it must be disposed of properly in accordance with national regulations.
If a wheelchair is to be disposed of, all components and materials of the power wheelchair must be recycled or disposed of properly.

⚠ CAUTION

Risk of polluting the environment with battery acid. The batteries of the power wheelchair contain a toxic acid. They must not be disposed of with regular domestic waste and the battery acid must not enter the sewage water system or ground. You must observe the battery manufacturer's instructions printed on the batteries.

2.8 Safety Instructions for Controller Configuration

⚠ WARNING

Risk of accidents and injury due to incorrect configuration settings. Modified parameter settings in the configuration can lead to changes in driving characteristics. In particular, changes to the speed, acceleration, braking or joystick settings can lead to unexpected and therefore uncontrollable operating performance with a risk of accidents.
Always test the driving characteristics of the power wheelchair after configuration / programming is complete.
Programming must only be completed by authorised personnel. Neither Otto Bock nor the control unit manufacturer are liable for damages (especially in combination with special controls) caused by programming that was not properly / professionally adapted to the abilities of the wheelchair user.

3 Transportation and Storage

The following environmental conditions apply to transportation and storage:

Ambient temperature -40 °C to +65 °C

3.1 Transportation

⚠ CAUTION

Risk of accidents due to insufficient fastening. The B600 power wheelchair must be properly fastened to the transportation vehicle in order to secure it against shifting, e.g. with tensioning straps.

NOTICE

Risk of damage due to falling. The maximum net weight of the B600 power wheelchair is 115 kg. Hoisting devices and transportation vehicles used for transportation must have sufficient capacity.

Secure the B600 power wheelchair inside the transportation vehicle, e.g. using tensioning straps. In order to do so, use the eyebolts at the front and back of the power wheelchair and the defined mounting points in the transportation vehicle.

Before transporting the power wheelchair, switch off the control unit and engage the brake.

You can reduce the size of the power wheelchair for transportation by folding down the back rest and removing the side panels and footrests.

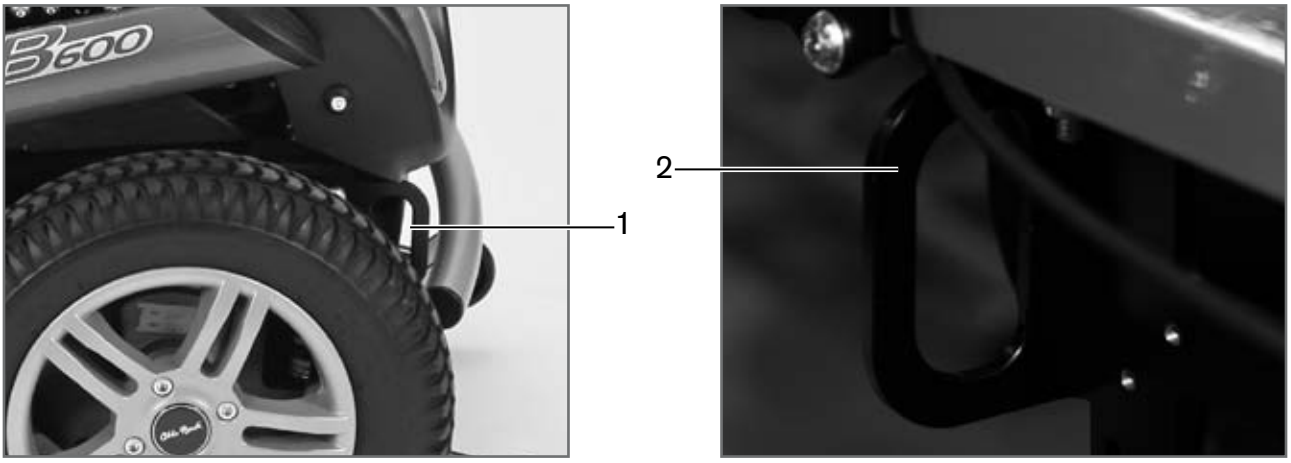


Figure 1 Eyebolts

1 Eyebolts, rear
2 Eyebolts, front

3.2 Storage

INFORMATION

If the B600 power wheelchair is not moved for several days, permanent colour changes may occur where the wheelchair comes into contact with the surface it is standing on. This is why Otto Bock recommends storage on a suitable surface during extended periods of disuse.

The B600 power wheelchair must be stored in an enclosed room. Remove the main fuse; otherwise, there is a risk of deep discharge.

The storage location must be dry and have sufficient air circulation. There must not be any build-up of humidity. The B600 power wheelchair must not be subjected to any damaging exterior influences, e.g. rain, snow or strong solar radiation during storage.

Otto Bock recommends storing the B600 power wheelchair with slightly elevated tyre pressure and to use assembly stands or wooden blocks in order to raise the tyres (completely) off the ground in order to protect them from frost. Regularly rotating the wheels helps to prevent flat spots.

4 Required Tools and Accessories

Suitable tools and accessories for the completion of service tasks are listed below:

- ❒ Flat screwdrivers, blade widths: 2.5/3.5/5.5 mm
- ❒ Phillips head screwdriver, size: 2
- ❒ Reversible ratchet handle wrench and sockets, sizes: 8 – 20
- ❒ Open-end or combination wrenches, sizes: 8 – 24
- ❒ Allen wrenches, sizes 2, 3, 4, 5, 6, 7, 8
- ❒ Torque wrench
- ❒ Socket, size 19
- ❒ Puller
- ❒ Pin punch, Ø 3 mm
- ❒ Plastic hammer
- ❒ Drill bit, size 4/6 mm + hand drill
- ❒ Plastic tyre mounting lever
- ❒ Inner tube repair kit
- ❒ Side cutting pliers
- ❒ Water pump pliers, gripping width up to 32 mm
- ❒ Liquid thread lock “medium strength”
- ❒ Handheld programming device

Figure 2 Tools

Figure 3 Handheld programming device

5 Information Display

INFORMATION

Please see Section 7.2 for information on the display of error messages using the control panel display / LCD monitor.

Messages are shown on the control panel display or LCD monitor:

Display symbol(s)	LCD monitor display	Function
		Driving menu with speed level and battery capacity
		Low battery capacity
		Charging process with drive stop
		Electric back adjustment
		Electric seat tilt
		Lift seat
		Electric footrests (both)
		Electric footrest left

		Electric footrest right
		Programmable functions (e.g. coupled electric seat adjustment > back rest and seat tilt)
		Drive-away lock
		Creep speed
		Attendant control

Table 1a – Information display

6 Service and Maintenance

6.1 Verification of General Condition

- ❒ Check all safety-related components for corrosion, repair if required and reapply corrosion protection.
- ❒ Check weld seams.
- ❒ Check tightness of screw connections; replace thread-locking compound if required; observe defined torque specifications; replace defective screws (e.g. in case of corrosion).
- ❒ Check cables for ruptures, signs of wear and proper attachment; replace defective components according to the cable layout plan.
- ❒ Check cable connections and plug connections.

6.2 Fuse Replacement

The fuse is located in a small yellow housing with a hinged cover outside the battery case.

Steps:

1. Open the battery strap.
2. Remove the cover.
3. Open the cover of the fuse housing.
4. Pull out the fuse and replace if required.

Properly reassemble all components upon completion of the work.

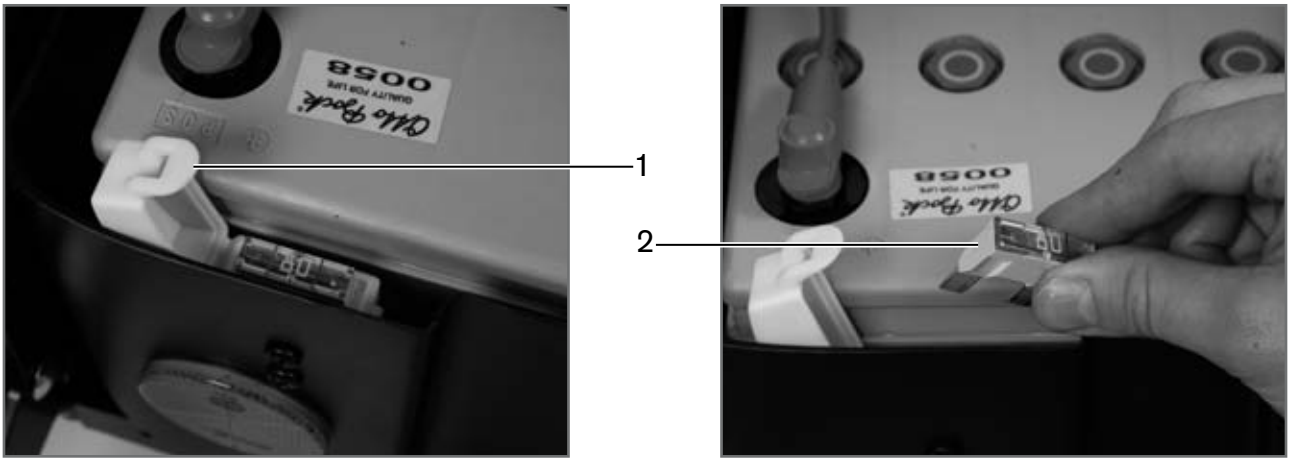


Figure 4 Fuse replacement

1 Fuse housing with open cover
2 Fuse, removed

6.3 Batteries

⚠ CAUTION

Risk of injury while working on the battery. Smoking and open flame are prohibited while working on the battery. Sparks must be avoided.
Explosive gases can develop while the batteries are charging. Observe the safety information provided by the battery manufacturer. Wear protective goggles. Ensure sufficient ventilation when charging the batteries in an enclosed room.
Drive batteries can supply very large amounts of energy and may arc if they are short-circuited. Therefore, always disconnect the batteries when working on the motor control or wiring.

⚠ CAUTION

Risk of polluting the environment with battery acid. The batteries of the power wheelchair contain a toxic acid. They must not be disposed of with regular domestic waste and the battery acid must not enter the sewage water system or ground. The battery manufacturer's instructions printed on the batteries must be observed.

NOTICE

Risk of battery damage. In order to prevent short circuits, always use insulated tools when working on the batteries. Prevent deep discharge of the batteries in order to avoid loss of functionality and permanent battery damage.
Ensure correct polarity is used when connecting the batteries and battery capacity meter.

The standard version of the B600 power wheelchair is equipped with two 12 V lead acid batteries with a capacity of 60 Ah. During the charging process, the water-acid mixture rapidly turns into gas. The B600 power wheelchair may be equipped with two gel batteries with a capacity of 74 Ah as an option.

6.3.1 Checking and Topping Up the Fluid Level (Only for Lead-Acid Batteries)

INFORMATION

Check the fluid level of wet-cell batteries regularly and top it up as required.

Tools:

❒ Flathead screwdriver, wide

Steps:

1. Pull up slightly on the locking handle at the bottom rear of the battery case and unlock the slide, then pull out the slide with the battery case.
2. Remove the fuse (see Section 6.2).
3. Disconnect all cables.
4. Lift the batteries out by the handles and set them down on a level surface.
5. The fluid level is visible from the outside. Compare it against the “Min” and “Max” labels on the front and rear of the batteries.
6. If the fluid level is too low, open the cover of the corresponding cell.
7. Add distilled water until the fluid level is between the “Min” and “Max” labels.

Properly reassemble all components upon completion of the work.

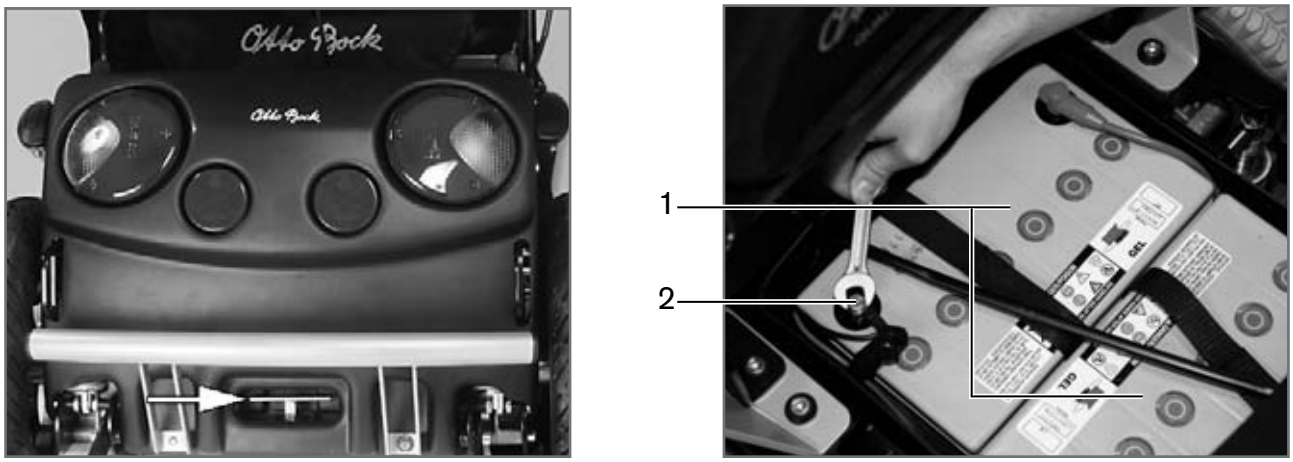


Figure 5 Battery case open, disconnecting cables

1 Battery case with gel batteries installed
2 Disconnecting the battery cables

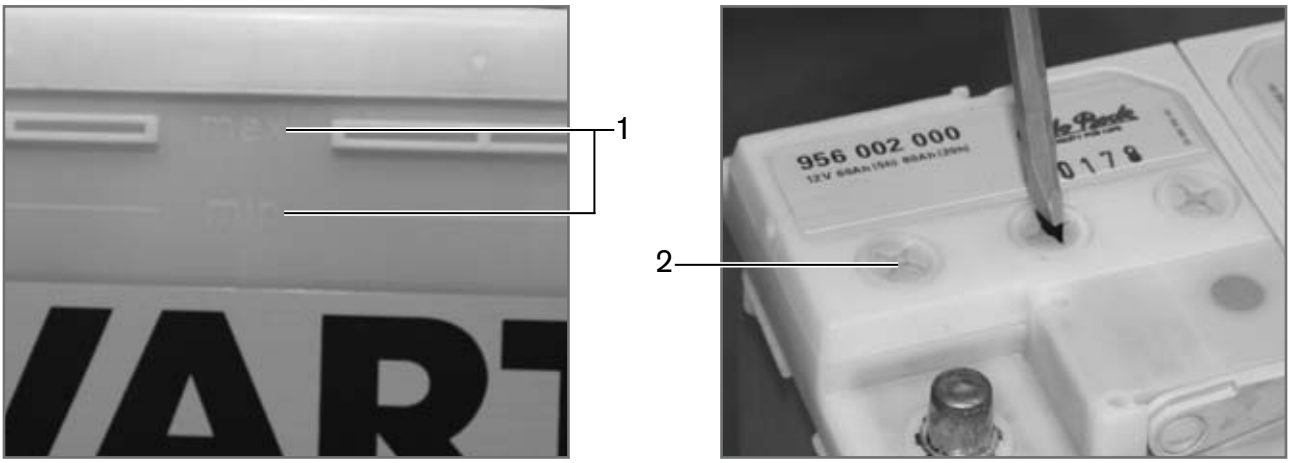


Figure 6 Fluid level indicator, battery cell

1 Min-max labels for the fluid level
2 Cover of an individual battery cell

6.3.2 Charging the Batteries

⚠ WARNING

Risk of injury due to incorrect charging profile adjustment. When switching from wet cell to gel batteries, changing the charging profile on the charger is mandatory (see notice on the charger).

NOTICE

Risk of battery damage. Ensure correct polarity is used when connecting the battery charger to the batteries.

NOTICE

Risk of damage due to incorrect battery handling. Please note the following when handling the batteries:
- Charge the batteries immediately if the bar at the bottom of the battery indicator is flashing.
- Do not charge in the green range.
- During extended periods of disuse, charge the batteries of the B600 power wheelchair weekly.
- Otto Bock assumes no liability for damage caused by deep discharge.

NOTICE

Risk of damage to the battery charger / risk of damage caused by the battery charger. Please note the following when using the charger:
- Only use a battery charger supplied by Otto Bock which has been tested and approved for the respective batteries by Otto Bock (observe information on the charger). Failure to do so can result in a battery explosion and possible impairment of health due to contact with battery acid.
- Only the battery charger provided by Otto Bock may be used for charging.
- The information on the nameplate of the charger must match the country-specific voltage of the respective power supply network.
- Only use the battery charger within the specified ranges of temperature and humidity.
- Place the rubber feet of the battery charger on a level surface.
- When setting the charger up close to a window, protect it against direct sunlight.
- Only use the battery charger within the specified ranges of temperature and humidity.
- Place the rubber feet of the battery charger on a level surface.

- When setting the charger up close to a window, protect it against direct sunlight.
- Keep the charger from overheating. The vent openings on the back of the charger must not be covered.
- Turn off the control unit during the charging process so that the entire charging current flows to the battery.
- Avoid dust and dirt. Only clean with a dry cloth.

The remaining battery capacity determines the range of the B600 power wheelchair. The following factors affect the battery capacity:

❒ Ambient temperature

❒ Age of the batteries

❒ Amount of use

❒ Charging process

Driving for an extended period of time in the lower range of the battery indicator will result in deep discharge and therefore battery damage. In addition, there is a risk that the B600 power wheelchair may stop due to zero battery capacity and bring the user into a dangerous situation (see above).

Tools:

❒ Charger approved by Otto Bock.

Steps:

1. Turn off the control unit on the power wheelchair.
2. Insert the 3-pin charger plug into the charging receptacle on the control panel.
3. Connect the battery charger to a wall outlet. The batteries will start charging automatically, and the current battery capacity is indicated on the LEDs on the battery charger (see Table 3).
4. When the charging process is complete, disconnect the battery charger from the wall outlet and from the control panel.
5. Turn on the control unit; the power wheelchair is now ready for operation.

Battery Charger SML 2409 sa SKII
MEG
= 1x = green
= 2x = green
low maintenance
maintenance-free (Gel)
Achtung! Vor dem Laden ist unbedingt die Gebrauchsanweisung zu lesen. Nur zur Verwendung in Räumen zugelassen. Nicht dem Regen aussetzen !
Attention! Carefully read through the operating instructions before using the charger. It is essential to obey the contained operating conditions. Use only in dry an well-ventilated locations!
IP21

Figure 7 Otto Bock charger

The battery charger indicates the following states:

Display	Function
Green LED is illuminated 1x	Low-maintenance battery
2x	Maintenance-free battery (gel)
Steady	Battery is charged to 80 %
Yellow LED is illuminated	Battery is charging
Green LED is illuminated	Battery is fully charged
Red LED is illuminated	Battery is defective or missing, or charging time has been exceeded

Table 3 LED display on the charger

The battery charger features a programmed recharging phase. Once a discharged battery is completely charged (after approximately 8 hours), the battery charger can remain connected with no risk of overcharging or damaging the battery.

6.3.3 Replacing the Batteries

⚠ CAUTION

Risk of injury due to electric current. Always remove the main fuse before doing any work on the batteries.

NOTICE

Risk of battery damage. Ensure correct polarity is used when connecting the batteries.

Preparation:

❒ Remove the battery cover (see Section 6.3.1).

❒ Remove the fuse (see Section 6.2).

Tools:

❒ Open-end or combination wrench, size 11

Steps:

1. Disconnect all battery cables.
2. Lift out the batteries by the handles and replace if required.

Properly reassemble all components upon completion of the work.

6.3.4 Removing the Battery Case

NOTICE

Risk of battery damage. Ensure correct polarity is used when connecting the batteries.

Preparation:

❒ Pull out the battery case (see Section 6.3.1).

❒ Remove the fuse (see Section 6.2).

❒ Remove the battery (see Section 6.3.3).

Steps:

1. After completing the preparations, the battery case can simply be removed and replaced if required.

Properly reassemble all components upon completion of the work.

6.3.5 Reinstalling the Battery Cable

NOTICE

Risk of battery damage. Ensure correct polarity is used when connecting the batteries.

Preparation:

❒ Pull out the battery case (see Section 6.3.1).

❒ Remove the fuse (see Section 6.2).

❒ Disconnect and remove the battery (see Section 6.3.3).

Tools:

❒ Allen wrench, size 3

❒ Open-end or combination wrench, size 11

Steps:

1. Insert the new battery cable through the hole at the front of the battery case.
2. Reinstall and reconnect the batteries.
3. Connect the battery cable at the proper location on the battery.
4. Remove the two-piece protective cover on the controller.
5. Remove all cable ties from the battery cable.
6. Disconnect the old battery cable from the controller (for controller connections, see Figure 9).
7. Connect the new battery cable to the controller and attach it with cable ties as before.

Properly reassemble all components upon completion of the work.

Figure 8 Removing the protective cover

6.3.6 Installing New Battery Vent Hoses (Only for Lead-Acid Batteries)

NOTICE

Risk of battery damage. Ensure correct polarity is used when connecting the batteries.

Preparation:

❒ Pull out the battery case (see Section 6.3.1).

❒ Remove the fuse (see Section 6.2).

❒ Remove the battery (see Section 6.3.3).

Tools:

❒ Open-end or combination wrench, size 11

Steps:

1. Route the battery vent hose through the hole at the rear of the battery case.
2. Insert the battery.
3. Properly connect the vent hose to the battery.

Properly reassemble all components upon completion of the work.

6.4 Replacing the Controller

INFORMATION

When connecting the cables, ensure correct assignment.

INFORMATION

For information on connecting the controller, please see Section 8.2.

Preparation:

❒ Pull out the battery case (see Section 6.3.1).

❒ Remove the fuse (see Section 6.2).

Tools:

❒ Allen wrench, size 3

Steps:

1. Remove the two-part protective cover (see Figure 8).
2. Disconnect all connections from the controller.
3. Loosen the two Allen head screws, remove the controller and replace if required.

Properly reassemble all components upon completion of the work.

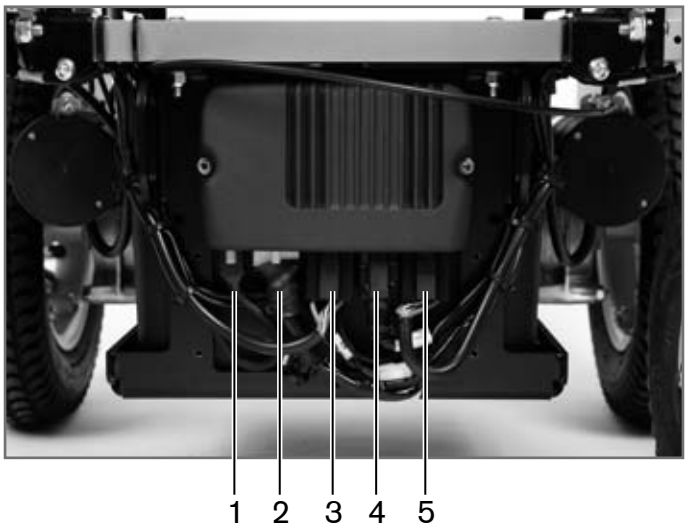


Figure 9 Controller

1 Control unit connector
2 Lighting / actuator connector
3 Motor connector 1
4 Lighting connector
5 Motor connector 2

6.5 Side Panels

6.5.1 Adapting / Replacing the Side Panels

A side panel attachment device is located on the left and right sides of the seat frame. The side panels with arm rests are inserted into these adapters. The height and position of the side panels can be individually adapted to the arm length of the wheelchair user.

Tools:

❒ Allen wrench, size 2

Forearm length adjustment

Steps:

1. Loosen the two set screws.
2. Change the position of the side panels by moving them forward or back, or remove and replace them if required.

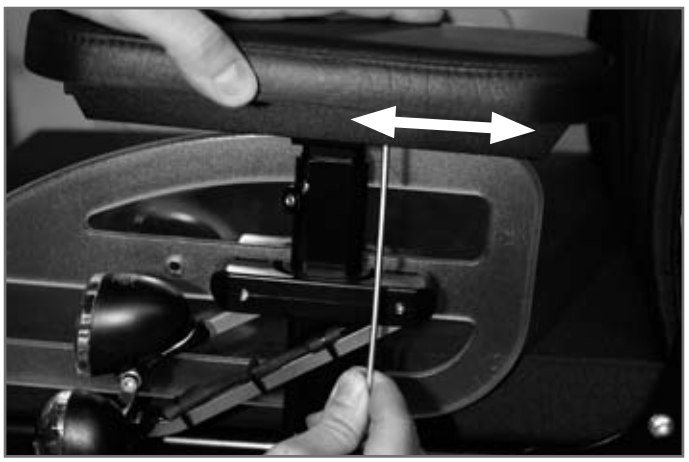


Figure 10 Adapting the side panel to the forearm length

Upper arm length adjustment

Steps:

1. Loosen the set screw at the top of the side panel attachment device.
2. Move the arm rest to the required height.
3. Tighten the set screw.

Figure 11 Adapting the side panel to the upper arm length

Replacing the side panel

Steps:

1. Loosen the wing nut on the side underneath the side panel attachment device.
2. Pull the side panel up and out, and replace if required.

Properly reassemble all components upon completion of the work.

Figure 12 Replacing the side panel

6.5.2 Replacing the Clothing Protector

Preparation:

❒ Remove the side panel.

Tools:

❒ Allen wrench, size 3

Steps:

1. Loosen the two Allen head screws on the side panel; ensure the lights are protected against falling if applicable.
2. Change the position of the clothing protector, or remove and replace it if required.

Properly reassemble all components upon completion of the work.

Figure 13 Replacing the clothing protector

6.5.3 Retrofitting Arm Straps

The arm strap must be anchored in the arm rest rail.

Tools:

❒ Allen wrench, size 4

Steps:

1. Insert lock cams into the track and position them as desired.
2. Place both strap ends with eyelets onto the set screw and secure with nuts.

Properly reassemble all components upon completion of the work.

Figure 14 Retrofitting arm straps

6.6 Footrests

INFORMATION

For information on installing the power footrests, please see Section 6.12.4.

6.6.1 Adapting / Replacing the Footrests

Various footrest systems with the same adjustment and mounting options are available for the B600 power wheelchair. The length and position of the footrests can be individually adjusted to the wheelchair user.

As an option to the standard version, elevating footrests with calf and knee pads may be installed.

Tools:

❒ Allen wrench, size 5

❒ Allen wrench, size 6

❒ Open-end or combination wrench, size 10

a) Adapting to the lower leg length

Steps:

1. Pull the footrest lock lever back and pull the footrest up and out (see Figure 15).
2. Loosen the two set screws (see Figure 16).
3. Adjust the length by pulling out or pushing in the footrest tube.

Properly reassemble all components upon completion of the work.

Figure 15 Unlocking the footrest

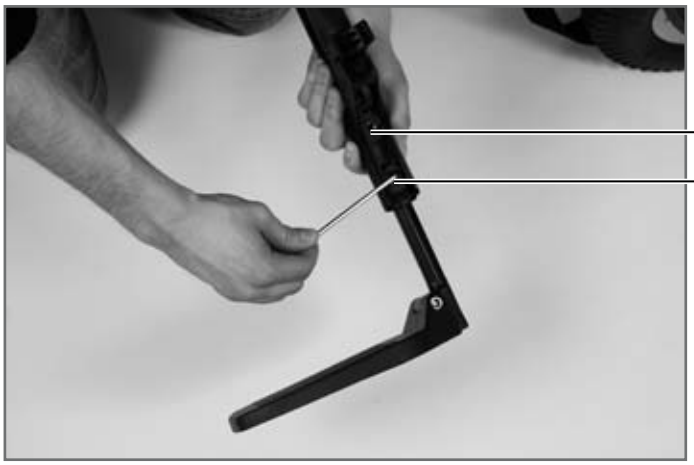


Figure 16 Adjusting the lower leg length

1 Set screw

b) Adapting to thigh length

This setting is changed on the footrest holder mounted to the seat frame.

Steps:

1. Pull the footrest lock lever back and pull the footrest up and out (see Figure 15).
2. Loosen the two Allen head screws on the back of the adapter.
3. Loosen the two Allen head screws on the left and right of the seat frame, respectively.
4. Disconnect the footrest tube from the adapter or adjust it to a different length.

Properly reassemble all components upon completion of the work.

Figure 17 Adjusting the footrest to the thigh length

c) Installing elevating footrests with calf and knee pads

Tools:

❒ Allen wrench, size 3

❒ Open-end or combination wrench, size 10

Steps:

1. Remove the standard footrest holder.
2. Install the footrest holder for elevating footrests.
3. Loosen the Allen head screws.
4. Remove and replace the standard footrests.

d) Replacing the knee pad

Steps:

1. Remove the footrest.
2. Loosen the Allen head screw.
3. Remove the knee pad or replace if required.

Properly reassemble all components upon completion of the work.

Figure 18 Replacing the knee pad

e) Replacing the calf pad

The calf pad is attached to the footrest tube.

Steps:

1. Remove the footrest.
2. Loosen the Allen head screw.
3. Remove the calf pad or replace if required.

Properly reassemble all components upon completion of the work.

Figure 19 Replacing the calf pad

6.6.2 Replacing the Footplate

Various footplates are available for the B600 power wheelchair. As an alternative to the standard version with segmented footplate, a continuous aluminium footplate may be installed.

Tools:

❒ Allen wrench, size 6

Steps:

1. Loosen the Allen head screw that connects the footplate to the installation kit.
2. Remove the footplate and replace if required.

Properly reassemble all components upon completion of the work.

Figure 20 Replacing the footplate

6.7 Wheels

⚠ CAUTION

Risk of injury due to worn or defective tyres. Replace wheels with PU tyres if the material is cracking or damaged, or when the tread becomes worn down to such an extent that there is only 5 mm of radius left on the outer edges of the tyre.
Replace the casing of pneumatic tyres if it is bald or shows signs of cracking or other damage.

The B600 power wheelchair is propelled by two 14" drive wheels and steered by means of two front steering casters. The B600 power wheelchair comes standard with 9" steering casters. 10" steering casters are available as an option.

6.7.1 Inspecting the General Condition

INFORMATION

Direct sunlight (UV light) causes the tyres to age prematurely. As a result, the tread surface hardens and corner pieces break out of the tread.

INFORMATION

Avoid parking the wheelchair outdoors whenever possible. Regardless of wear and tear, the tyres should be replaced every 2 years.
If the wheelchair is parked for an extended period of time or the tyres overheat (e.g. in the vicinity of radiators or in case of exposure to strong sunlight behind glass), the tyres may become permanently deformed. Therefore, sufficient clearance should always be maintained from sources of heat, and the wheelchair should be moved frequently or placed on blocks for storage.

Steps:

1. Verify the tyre condition in regards to tread, porosity and cracking.

6.7.2 Replacing the Casing or Inner Tube of Pneumatic Tyres

Both the steering casters and drive wheels have two-piece rims that can be separated by removing the Allen head screws.

Tools:

❒ Plastic tyre mounting lever

❒ Inner tube repair kit

❒ Allen wrench, size 6

Steps:

1. Let the air out of the tyre.
2. Loosen all five Allen head screws.
3. Separate the two pieces of the rim.
4. Pry back the casing from the edges of the rim.
5. Push the valve completely through to the inside of the rim and pull out the tube.
6. Replace the tube or repair it with a conventional bicycle tube repair kit.

Properly reassemble all components upon completion of the work.

Figure 21 Removing the casing

6.7.3 Replacing the Drive Wheel

NOTICE

Risk of damage due to improper preparation of maintenance tasks. Use suitable objects such as wooden blocks to secure the B600 power wheelchair against sliding or tipping. The drive wheels must rotate freely.

Tools:

❒ Torque wrench

❒ Allen wrench, size 6

Steps:

1. Jack up the drive wheels.
2. Loosen all four Allen head screws, remove the wheel and replace if required.

Properly reassemble all components upon completion of the work.

INFORMATION When installing the wheel, tighten all four Allen head screws to a torque of **25 Nm**.

Figure 22 Removing the drive wheel

6.7.4 Replacing the Wheel Flange

Preparation:

❒ Remove the wheel.

Tools:

❒ Socket, size 19

❒ Puller

Steps:

1. Loosen the screw (see Figure 23).
2. Use the puller to remove the wheel flange and replace if required (see Figure 24).

Properly reassemble all components upon completion of the work.

INFORMATION When installing the wheel, tighten all four Allen head screws to a torque of **55 Nm**.

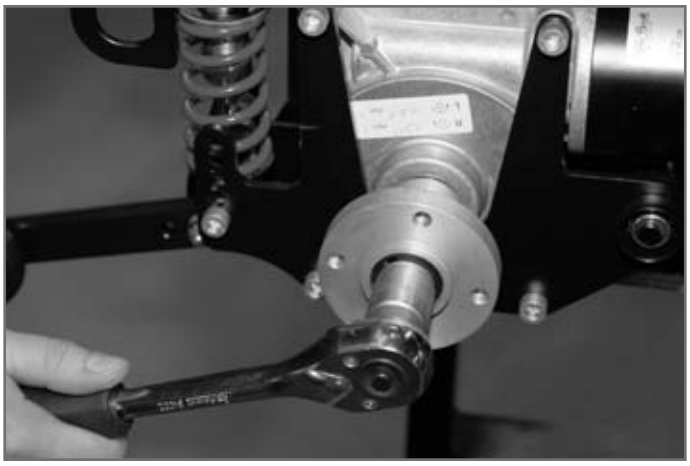


Figure 23 Loosening the wheel flange screw

Figure 24 Applying the puller

6.7.5 Removing the Drive Wheel Spring or Changing the Coefficient

NOTICE

Risk of damage due to improper preparation of maintenance tasks. Use suitable objects such as wooden blocks to secure the B600 power wheelchair against sliding or tipping. The drive wheels must rotate freely.
The drive wheel springs are attached at two points: On the drive unit sustainer at the top and on the oscillating crank.

Preparation:

❒ Remove the drive wheel (see Section 6.7.3).

❒ Open the battery case (see Section 6.3.4).

Tools:

❒ Allen wrench, size 5

❒ Allen wrench, size 6

❒ Open-end or combination wrench, size 13

Steps:

1. Loosen both Allen head screws holding the drive wheel spring.
2. Remove the spacers and drive wheel spring.
3. Install a new drive wheel spring if required, or change the coefficient (turn the upper plate up or down by hand):
    a. Turn to the left: Greater spring tension.
    b. Turn to the right: Less spring tension.

INFORMATION Make sure that both springs are adjusted equally! The factory default setting is **60 mm** from the spindle to the spring plate.

Properly reassemble all components upon completion of the work.

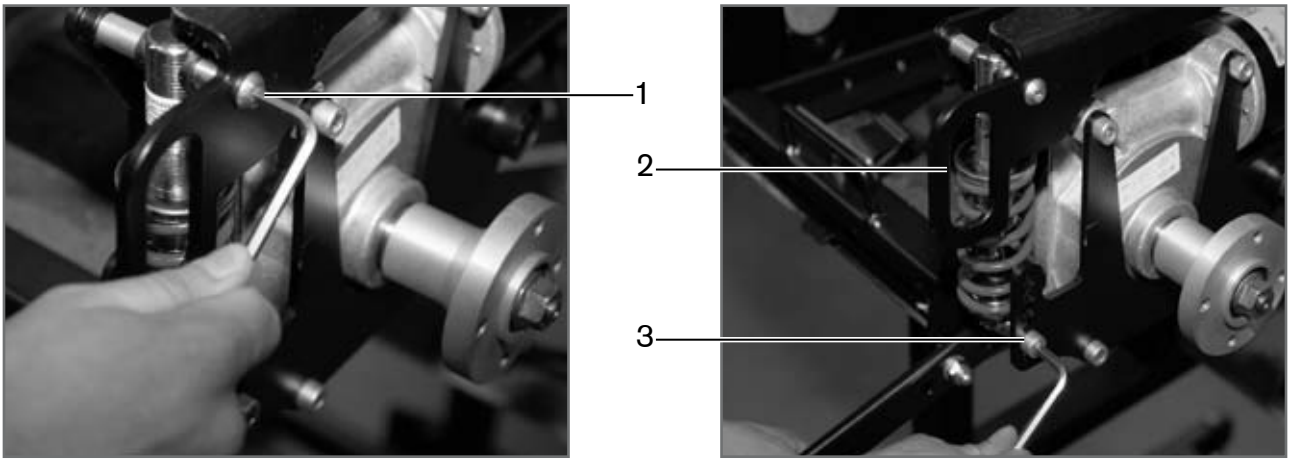


Figure 25 Removing the drive wheel spring

1 Upper screw connection
2 Plate to change the coefficient
3 Lower screw connection

6.7.6 Installing the Drive Wheel Splash Guard (Option)

NOTICE

Risk of damage due to improper preparation of maintenance tasks. Use suitable objects such as wooden blocks to secure the B600 power wheelchair against sliding or tipping. The drive wheels must rotate freely.

The splash guard is screwed to the motor mount.

Preparation:

❒ Remove the drive wheels.

Tools:

❒ Allen wrench, size 4

❒ Open-end or combination wrench, size 10

Steps:

1. Hold the splash guard up against the motor mount so that the mounting holes line up.
2. Insert two Allen head screws and secure using cap nuts.

Figure 26 Installing the drive wheel splash guard

6.7.7 Replacing the Steering Caster

NOTICE

Risk of damage due to improper preparation of maintenance tasks. Use suitable objects such as wooden blocks to secure the B600 power wheelchair against sliding or tipping. The drive wheels must rotate freely.

INFORMATION

When installing the steering caster, ensure that the steering caster and drive wheel are aligned.

Tools:

❒ Two Allen wrenches, size 4

Steps:

1. Loosen the Allen head screw.
2. Remove the steering caster and replace if required.

Properly reassemble all components upon completion of the work.

Figure 27 Removing the steering caster

6.7.8 Replacing the Caster Fork / Installing the Curb Climbing Assist or Caster Fork

INFORMATION

Do not tighten the fork too snugly; the fork must be able to turn by approximately 180° at a time.

The caster forks for the B600 power wheelchair are supplied as complete units. They come standard without a spring or curb climbing assist. Both items are available as options. To install an option, the complete caster fork is replaced.

Tools:

❒ Socket, size 19

Steps:

1. Remove the black plastic protective cap.
2. Loosen the nut.
3. Remove the caster fork and replace if required.

Properly reassemble all components upon completion of the work.

Figure 28 Caster fork standard

Figure 29 Caster fork with curb climbing assist

Figure 30 Caster fork with spring

6.7.9 Installing the Caster Swivel Lock (Option)

Tools:

❒ Allen wrench, size 2

❒ Pin punch

Steps:

1. Slide the spring onto the thin end of the bolt and insert both into the bore in the frame from below.
2. Slide the set screw onto the locking lever and tighten.

Figure 31 Installing the caster swivel lock

6.7.10 Installing the Splash Guard for the Caster Fork (Option)

INFORMATION

When installing the steering caster, ensure that the steering caster and drive wheel are aligned.

The splash guard for the steering caster is attached to the caster fork.

Preparation:

❒ Removing the steering caster

Tools:

❒ Allen wrench, size 3

Steps:

1. Hold the splash guard up against the caster fork so that the mounting holes line up.
2. Insert two Allen head screws through the holes from the inside to the outside and then tighten.

Figure 32 Installing the splash guard for the caster fork

6.8 Brake and Brake Release

6.8.1 Replacing the Brake Release

⚠ CAUTION

Risk of accidents and injury due to rolling. Before working on the brake release, turn off the B600 power wheelchair. Secure the B600 power wheelchair so it cannot roll away.

INFORMATION

Only mount the brake release while it is unlocked. Ensure that the short Bowden cable is at the bottom. The Bowden cable for the left side passes in front of the drive unit sustainer.

Depending on user preferences, the brake release is located on the frame cross brace at the front to the right or left under the seat.

Tools:

❒ Allen wrench, size 4

❒ Allen wrench, size 7

Steps:

1. Loosen the Bowden cables on the drive motors.
2. Loosen the Allen head screw on the frame cross brace.
3. Open the cable ties.
4. Remove the brake release and replace if required.

Properly reassemble all components upon completion of the work.

Figure 33 Replacing the brake release

6.8.2 Setting / Adjusting the Brake Release

The Bowden cables are normally adjusted on the brake release housing. If the correct setting cannot be obtained by means of the adjustment screw, the threaded rod on the other end of the Bowden cable can be moved by approximately 5 – 8 mm on the drive motor side. Subsequently, the brake release must be completely readjusted. When making adjustments for the first time (e.g. cable replacement), the Bowden cable should have very little play before adjusting it.

Tools:

❒ 2 open-end or combination wrenches, size 7, to establish the setting

❒ 2 open-end or combination wrenches, size 8, to make adjustments

INFORMATION Lock the adjustment screw every time the setting is changed. Otto Bock recommends making adjustments in small increments (½ turn).

a) Adjusting an over-tightened Bowden cable

Steps:

1. Loosen the M5 counter nut (SW 8) and turn the adjustment screw clockwise on the brake release housing.
2. Commence functionality check from the beginning.

b) Adjusting a slack Bowden cable

Steps:

1. Loosen the M5 counter nut (SW 8) and turn the adjustment screw counter-clockwise on the brake release housing.
2. Commence functionality check from the beginning.

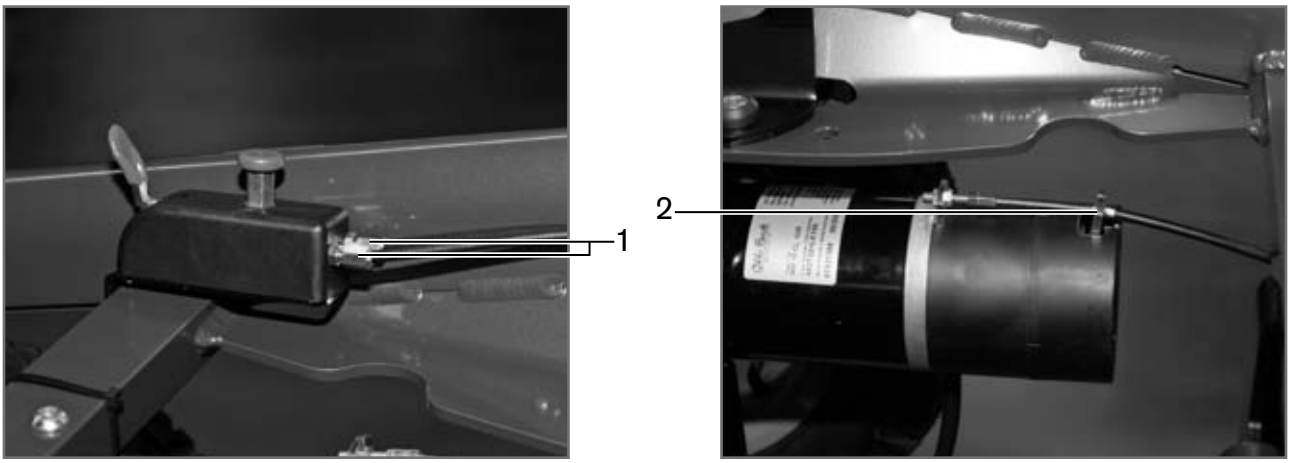


Figure 34 Adjusting the Bowden cable

1 Adjustment screws on the brake release housing
2 Threaded rod for readjustment

6.8.3 Brake Settings

⚠ CAUTION

Risk of accidents and injury due to a lack of brake functionality. Incorrect brake settings can lead to a loss of braking power. Repairs and settings must only be made by authorised personnel. Replace damaged Bowden cables with new ones immediately.

Correct brake settings are essential for safe driving. This is why Otto Bock recommends inspecting the brake every three months.

To avoid excessive friction, the radius of the Bowden cable must not be less than 10 cm.

Damaged Bowden cables must be replaced immediately, for example if individual wires are protruding or there is a kink in the black sheath.

6.8.4 Functional Test of Brake Settings

During the functional test of the brake settings, please observe the following points and complete the tasks described below:

Steps:

1. Lock the release lever in position 1.
2. While driving straight forward at approximately 6 km/h, release the joystick in its front-most position.
3. If the wheelchair maintains its current direction during the delay, repeat the test on a slope of 10% unless this is limited by information on the nameplate.

4. If the wheelchair leaves the current direction, adjust the Bowden cable for the opposite side. The adjustment process is described in Section 6.8.2 under “Adjusting an over-tightened Bowden cable”.
5. If the wheelchair tracks properly in both cases, conduct the following test on an even surface:
    a. Pull the release bolt on the brake housing. The lever automatically moves forward into position 2. You should not be able to push the wheelchair with the lever in this position. If the drive wheels do not lock, loosen the Bowden cable for the side with the wheel that still rotates by ½ turn (see Section 6.8.2 “Adjusting an over-tightened Bowden cable”.
    b. Turn the lever to position 3. The wheelchair can be pushed easily, even when turning. If the wheelchair pulls to one side, tighten the Bowden cable on the corresponding side. The adjustment process is described in Section 6.8.2 under “Adjusting a slack Bowden cable”.
6. If no deviations are found during the tests described above, no readjustment is necessary.

6.9 Lighting

The lighting is connected to the controller underneath the seat (see Section 8.2 for connections). The controller is pre-programmed. It can be adapted to the respective lighting system by programming it using the handheld programming device (see Section 8.4).

6.9.1 Retrofitting Lighting

The optionally available lighting for the B600 power wheelchair may be retrofitted at any time.

a) Front lights

The front lights are attached to the side panel.

Preparation:

❒ Remove the side panel.

Tools:

❒ Allen wrench, size 3

Steps:

1. Unscrew the plastic adapter on the side panel.
2. Insert the light holder into the outer slots and screw into place (see Figure 33).
3. Attach the light cable along the seat frame using cable ties.
4. Connect the light cable to the corresponding input on the controller underneath the seat (see Section 8.2).

Properly reassemble all components upon completion of the work.

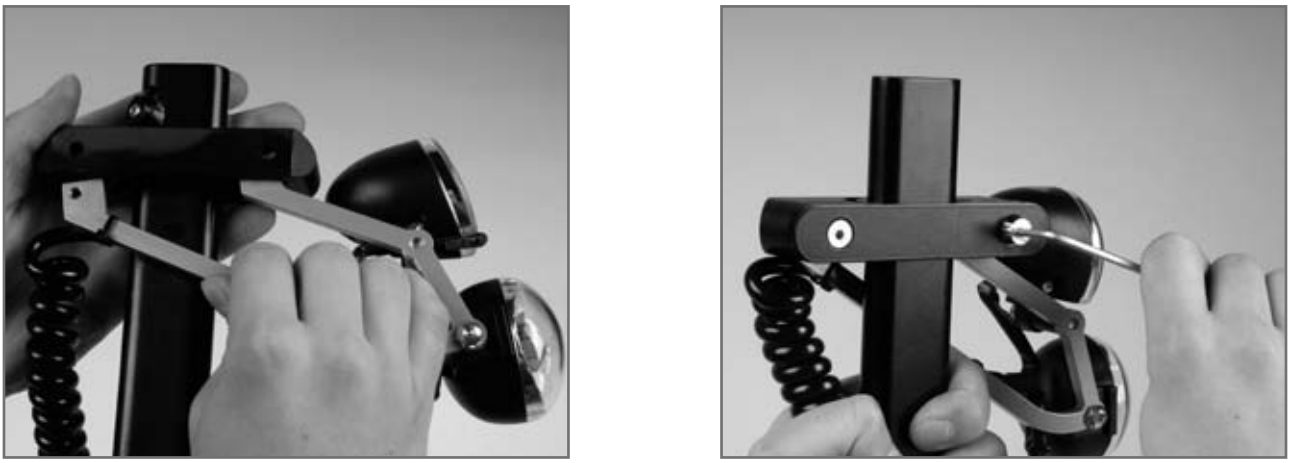


Figure 35 Retrofitting front lights

b) Rear lights

The rear lights are integrated into the rear covering.

Tools:

❒ Philips screwdriver

Steps:

1. Loosen the screws underneath the rear covering locking mechanism (see Figure 36).
2. Loosen the mounting screws for the rear lighting and remove the rear covering.
3. Detach the rear lighting from the metal crossbrace.
4. Push the light holder onto the metal crossbrace and screw it in place (see Figure 37).
5. Attach the light cable along the seat frame using cable ties.
6. Connect the light cable to the corresponding input on the controller underneath the seat (see Section 8.2).

Properly reassemble all components upon completion of the work.

Figure 36 Detaching the rear covering

Figure 37 Detaching the rear lighting from the metal crossbrace

6.9.2 Replacing Defective Lamps

Tools:

❒ Allen wrench, size 3

❒ Flathead screwdriver, small

Headlights

Steps:

1. Fold the halogen lamp with cover forward by pressing the black locking lever on the bottom of the lamp.
2. Pull the retaining ring back.
3. Pull the halogen lamp back, remove it and replace if required.
4. Properly reassemble all components upon completion of the work.

INFORMATION During installation, ensure that the notch on the halogen lamp socket is positioned correctly and engages.

Figure 38 Replacing the halogen lamp in the headlight

Front direction indicator

Steps:

1. Slightly press into the recess at the top of the housing until the lug disengages.
2. Fold down the cover.
3. Turn the bulb counter-clockwise by one-quarter turn and remove it.

Properly reassemble all components upon completion of the work.

INFORMATION During installation, ensure that the lug on the bulb engages in the notch on the socket.

Figure 39 Replacing the front direction indicator lamp

Rear direction indicator

Steps:

1. Loosen the two screws and remove the protective pane.
2. Remove the bulb from the socket towards the front and replace it.

Properly reassemble all components upon completion of the work.

Tail light

Steps:

1. Loosen the two screws and remove the protective pane.
2. Pull the bulb from the socket towards the bottom and replace it.

Properly reassemble all components upon completion of the work.

INFORMATION During installation, ensure that the lug on the bulb engages in the notch on the socket.

INFORMATION Ensure the protective pane is properly positioned in the housing during installation. Tighten the screws for the protective pane thoroughly so that moisture cannot penetrate the lamp.

Figure 40 Bulb replacement, direction indicators and tail lights

1 Direction indicator bulb
2 Rear light bulb

6.10 Seats

⚠ CAUTION

Risk of burns in the proximity of fire. The back rest and seat bottom of the B600 power wheelchair are flame retardant but nevertheless flammable. Therefore utmost caution is required near any sources of open flame or sparks, especially lit cigarettes.

NOTICE

Risk of damage to seat upholstery. During any work on the seat, the upholstery must be adequately protected against mechanical and chemical damage.

6.10.1 Replacing the Bearing Plate

Tools:

❒ Allen wrench, size 5

❒ Open-end or combination wrench, size 13

Steps:

1. Loosen the three Allen head screws identified with arrows.
2. Remove the bearing plate and replace if required.

INFORMATION The screw in the middle of the plate serves as stop for the back angle adjustment.

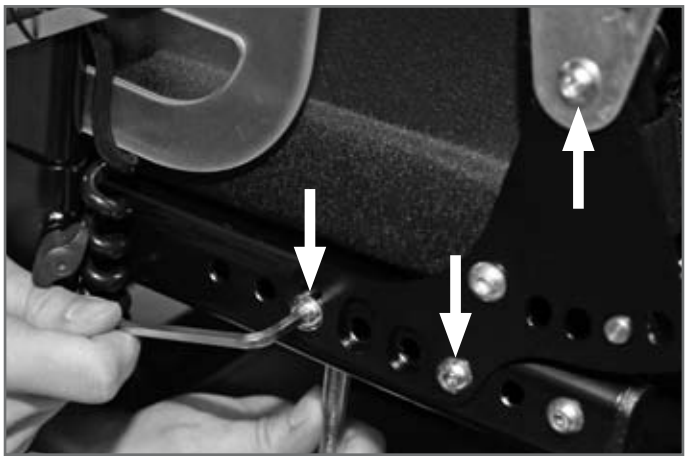


Figure 41 Replacing the bearing plate

6.10.2 Standard Seat: Replacing / Adjusting the Back Upholstery

Steps:

1. Completely remove the back upholstery and readjust, remove or replace the hook and loop straps according to individual user requirements.

Figure 42 Standard seat: Back upholstery

6.10.3 Standard Seat: Replacing the Seat Frame

NOTICE

Risk of cable damage. Take note of the cables attached to the seat frame with cable ties. Carefully cut the cable ties with side-cutting pliers or a knife. Ensure that you do not damage the cables during this process!

Preparation:

❒ Remove the side panels.

Tools:

❒ Allen wrench, size 5

❒ Open-end or combination wrench, size 13

Steps:

1. Loosen all cables connected to the seat frame by cable ties.
2. Loosen the two Allen head screws on the front seat brackets.
3. Loosen the two Allen head screws at the rear.
4. Remove the seat frame and replace if required.

Properly reassemble all components upon completion of the work.

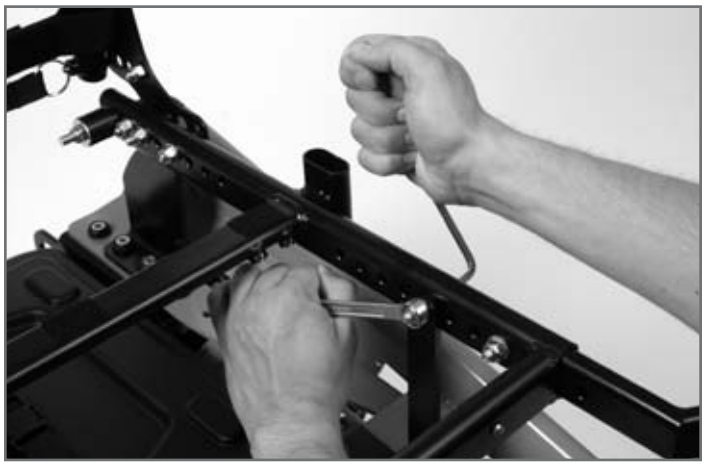


Figure 43 Standard seat: Replacing the seat frame

6.10.4 Standard Seat: Replacing the Seat Plate

Only standard seats have a seat plate.

Steps:

1. Remove the seat cushion.
2. Unlock the back rest and fold it forward.
3. Pull the seat plate up with a sharp tug and replace if required.

Properly reassemble all components upon completion of the work.

Figure 44 Standard seat: Replacing the seat plate

1 Seat cushion
2 Seat plate

6.10.5 Standard Seat: Changing the Seat Height

NOTICE

Risk of cable damage. Ensure the cables attached to the frame with cable ties are not damaged.

Changing the seat height of the B600 power wheelchair requires replacement of the seat brackets. The seat brackets are attached to the front of the frame with clamping brackets.

Preparation:

❒ Remove the seat.

Tools:

❒ Allen wrench, size 5

❒ Open-end or combination wrench, size 13

Steps:

1. Remove the black plastic caps of the rear Allen head screws.
2. Loosen the Allen head screws on the rear brackets.
3. Loosen the Allen head screws on the two front brackets.
4. Remove the seat brackets from the seat frame and replace if required.

Properly reassemble all components upon completion of the work.

Figure 45 Front and rear seat brackets

1 Front seat bracket
2 Rear seat bracket

6.10.6 Standard Seat: Adjusting the Seat Angle

(without electrical or mechanical seat tilt)

The two front seat brackets are used to adjust the seat angle. These brackets have several bore holes on their lower end. The angle of the seating unit is changed by using a different bore hole: e.g. upper bore hole 0°, middle bore hole 3°, or lower bore hole 6°.

Tools:

❒ Allen wrench, size 5

❒ Open-end or combination wrench, size 13

Steps:

1. Loosen the screw connections between the seat brackets and the adjustment brackets.
2. Push the seating unit up or down until the desired seat angle is achieved.
3. Screw the seat brackets to the adjustment brackets.

Properly reassemble all components upon completion of the work.

Figure 46 Adjusting the seat angle

6.10.7 Standard Seat: Replacing / Adjusting the Side Panel Attachment Device

The attachment device is located on either side on the rear cross brace under the seat.

Tools:

❒ Allen wrench, size 4

Steps:

1. Loosen the two set screws.
2. Remove the side panel attachment device and replace or readjust as required.

Properly reassemble all components upon completion of the work.

Figure 47 Side panel attachment device

1 Side panel attachment device

6.10.8 Installing the Contour Seat (Option)

The optional contour seat is attached to the seat plate with hook and loop straps. You can mount the contour seat on the frame of the standard seat.

Tools:

❒ Allen wrench, size 3

Steps:

1. Set the seat bottom with hook and loop straps onto the seat plate and press it into place.
2. Remove the back upholstery.
3. Slip three mounting clamps for the back of the contour seat onto the right and left of the frame, respectively.
4. Put the seat back in place and mount it with six Allen head screws.

Figure 48 Contour seat back rest with mounting clamps

1 Frame for back rest
2 Contour seat back rest
3 Mounting clamps (6)

6.10.9 Recaro® Seat: Replacing the Base Frame

Tools:

❒ Allen wrench, size 5

Steps:

1. Pull the latch underneath the seat, slightly lift the seat and push it back.
2. Remove the seat.
3. Unscrew the seat brackets from the front and rear of the frame.
4. Remove both parts of the Recaro® base frame and replace if required.

Properly reassemble all components upon completion of the work.

6.10.10 Recaro® Seat: Replacing the Seat Attachment Device

The seat attachment device of the Recaro® seat is screwed to the underside of the seat.

Tools:

❒ Allen wrench, size 4

Steps:

1. Unlock and remove the seat.
2. Lay down the seat and loosen the three Allen head screws on each side of the seat attachment device.
3. Remove the seat attachment device and replace if required.

Properly reassemble all components upon completion of the work.

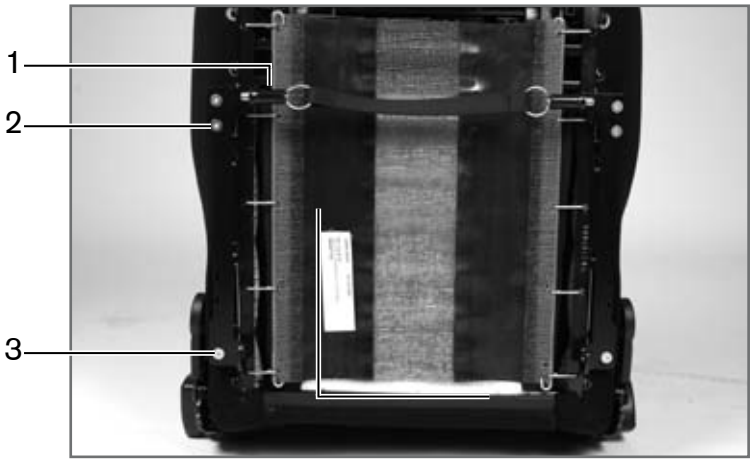


Figure 49 Recaro® seat, bottom view

1 Release mechanism pin
2 Seat bracket attachment, front
3 Seat bracket attachment, rear

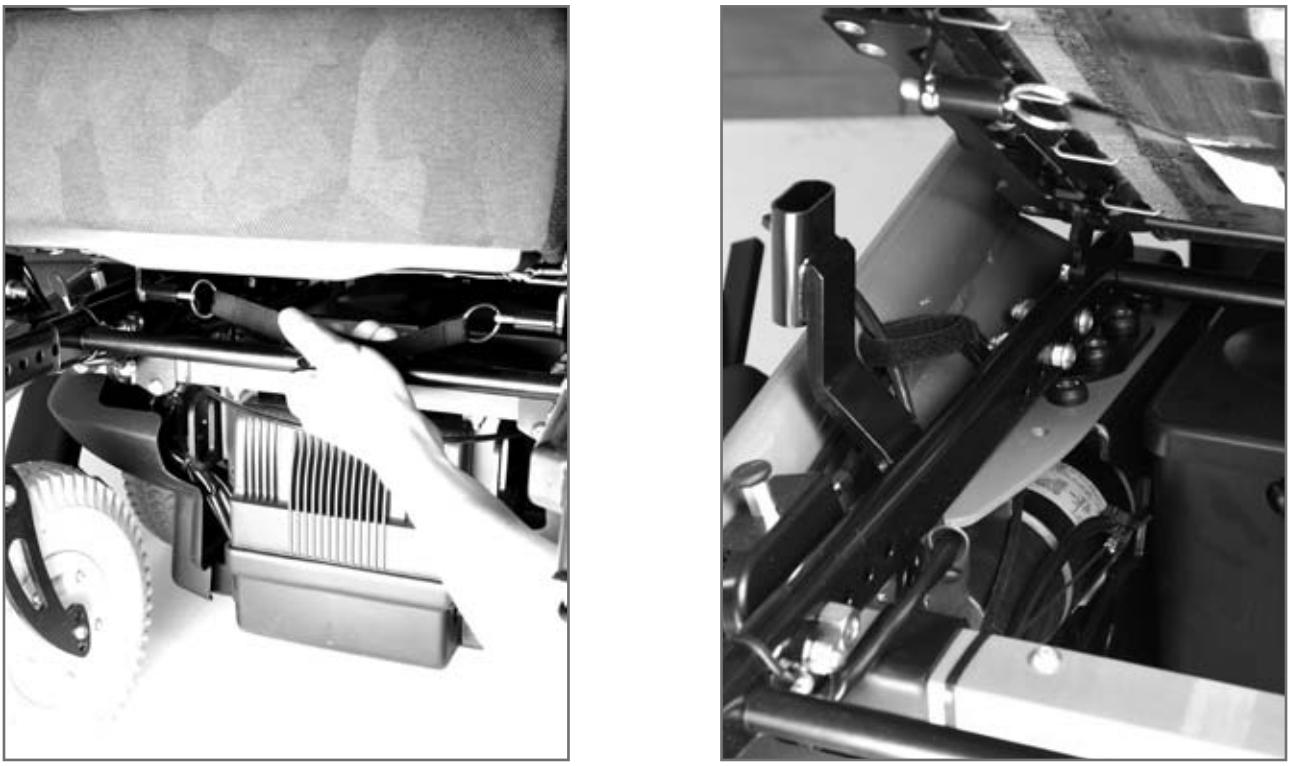


Figure 50 Recaro® seat: Unlocking and mounting

6.10.11 Recaro® Seat: Retrofitting Seat Modules (Option)

The seat bottom of the Recaro® seat module is attached to the seat frame and removed in the same manner as the complete Recaro® seat. The modular back rest is hooked into the seat bottom. Two corresponding adapters are found on the seat bottom.

Tools:

❒ Flat screwdriver

Steps:

1. Attach the safety plate to the front adapter.
2. Hook the back rest onto the seat bottom.
3. Attach the front locking mechanism to the rear adapter.

Properly reassemble all components upon completion of the work.

6.11 Seating System Options

6.11.1 Installing the Headrest Installation Kit (Option)

The headrest holder is attached to the back frame.

Tools:

❒ Allen wrench, size 3

❒ Open-end or combination wrench, size 10

Steps:

1. Attach the holder to the top of the back tube with two screws.

A round back tube requires an adapter plate in order to compensate for the curvature (ordered separately). The holes are predrilled.

Figure 51 Installing the headrest installation kit

6.11.2 Retrofitting the Four-Way Chest Strap (Option for Recaro® Seat Only)

Tools:

- ❒ Screwdriver
- ❒ Allen wrench, size 4
- ❒ Hand drill
- ❒ Drill bit, size 4

Steps:

1. Screw the cross tube to the back of the seat frame (see Figure 52-1).
2. Attach the single strap end to this tube (see Figure 52-2):
    a. Spread the two eyelets so they fit over this tube.
    b. Insert the screw through the eyelets and bore hole in the centre of the tube and tighten the screw.
3. Remove the protective cap from the button (see Figure 52-3).
4. Remove the back adjustment button from the back rest (see Figure 52-4).
5. Press out the three small plastic nipples from the rear (see Figure 52-5).
6. Remove the rest of the covering.
7. Of the two holes in the metal plate, bore out the top hole (for the strap mounting screws) (see Figure 52-6).
8. Attach both of the other strap ends to these bore holes.
9. Install the covering and adjustment button.

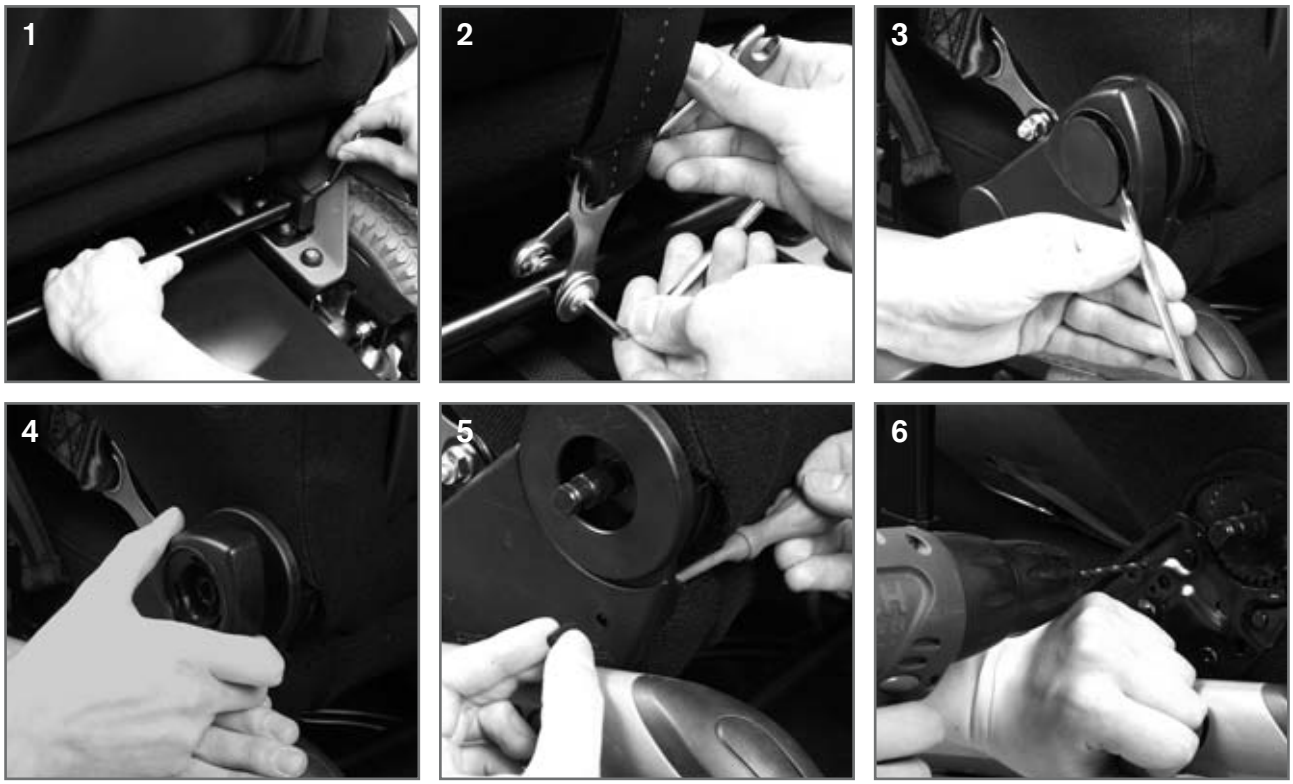


Figure 52 Installing / retrofitting the four-way chest strap (only for Recaro® seat)

6.11.3 Retrofitting the Lap Belt (Option)

The lap belt is available for both seat models and is attached to the sides but not to the back of the seat frame.

For the standard seat, the belt is attached and screwed to the bearing plate with a bracket and eyelet.

Figure 53 Retrofitting the lap belt

6.12 Electric Seat Functions

INFORMATION

A seat module is required if more than two electric seat functions are installed (see Section 6.12.5).

INFORMATION After new electric seat functions are installed and connected, the control unit has to be reprogrammed. Please see the “enAble50 Instructions for Use” for more information.

6.12.1 Retrofitting the Electric Seat Tilt (Option)

The B600 power wheelchair may be retrofitted with a seat tilt option. It is integrated into the seat frame and operated by an actuator. The seat tilt option is delivered as a preassembled unit (seat tilt; combination lift seat / seat tilt).

Preparation:

❒ Remove the old seat including the seat plate and seat frame (see Section 6.10).

Tools:

❒ Allen wrench, size 5

❒ Open-end or combination wrench, size 13

Steps:

1. Install the frame of the seat tilt installation unit with supplied seat brackets (Figure 54-1: Front seat brackets, Figure 54-2: Rear seat brackets) on the wheelchair frame.
2. Install the cables.

   INFORMATION Ensure the cable length is sufficient when the seat tilt option is activated and that the cables cannot be crushed.

   INFORMATION If the “Heavy Duty” lift seat is equipped with a seat tilt option, also ensure that the spiral cable of the seat tilt motor is centred on the crossbrace for the lift seat unit and attached with cable ties (Figure 54-4).
3. Connect the additional cable (Figure 54-3) to the actuator.
4. Connect the additional cable to the controller (or seat module if applicable).
5. Install the seat back on the bearing plate (see Section 6.10.1).
6. Fully assemble the seat with side panels, footrests etc.
7. Program the control unit.

Figure 54 Retrofitting the electric seat tilt option

6.12.2 Retrofitting the Electric Back Angle Adjustment (Option)

A back frame with crossbrace, new upholstery and a back rest actuator are required to install the electric back angle adjustment option. The electric back angle adjustment option is delivered as a preassembled unit.

Preparation:

❒ Remove the back frame from the bearing plate / seat frame (see Section 6.10.1).

Tools:

❒ Allen wrench, size 5

❒ Open-end or combination wrench, size 13

Steps:

1. Install the bearing plate with the crossbrace of the electric back angle adjustment option (Figure 55-1).
2. Install the back frame on the bearing plate / seat frame.
3. Connect the actuator ratchet bolt to the locking mechanism of the crossbrace (Figure 55-2).
4. Fasten the additional cables to the frame with cable ties to prevent them from extending into the adjustment range.

INFORMATION Ensure the cable length is sufficient when the back angle adjustment option is activated and that the cables cannot be crushed.

5. Connect the additional cable to the actuator.
6. Connect the additional cable to the controller (or seat module if applicable).
7. Program the control unit.

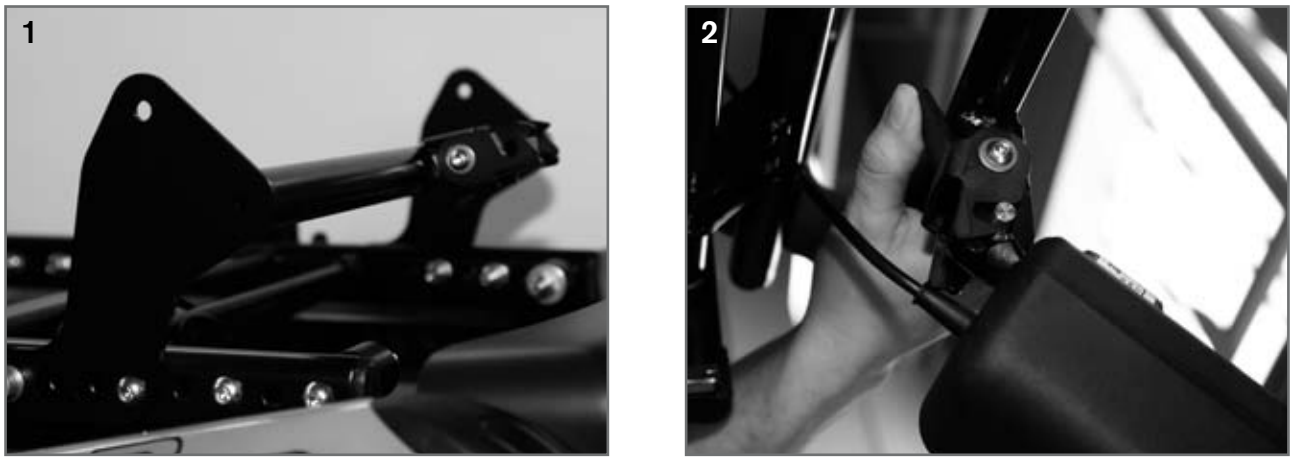


Figure 55 Retrofitting the electric back angle adjustment option

6.12.3 Retrofitting the Lift Seat (Option)

INFORMATION

For a patient weight >120 kg or when installing a combination lift seat and seat tilt unit, reinforced springs have to be installed between the oscillating crank and drive unit sustainer (see Section 6.7.5). When installed the “Heavy Duty” version of the lift seat for a patient weight of 180 kg, please note that a reinforced side panel is required (see Figure 56-6). The seat width can be increased by up to 60 mm in 20 mm increments with the use of spacers.

INFORMATION

If a seat module is required, it is installed on the lower lift seat frame at the front of the drive unit sustainer.

The B600 can be equipped with two versions of a lift seat (up to 120 kg, “Heavy Duty” up to 180 kg). The lift seat is delivered as a preassembled unit (lift seat; combination lift seat / seat tilt).

Preparation:

❒ Remove the old seat including the seat plate and seat frame. See Section 6.10.

Tools:

❒ Allen wrench, size 5

❒ Open-end or combination wrench, size 13

Steps:

1. Install the frame of the lift seat installation unit with supplied seat brackets (Figure 56-2: Front seat brackets, Figure 56-3: Rear seat brackets) on the wheelchair frame.
2. Fasten the additional cables to the frame with cable ties to prevent them from extending into the adjustment range.

   INFORMATION The cabling is routed from the opening of the top expansion bellows plate along the cable track installed on the right and left (Figure 56-4) to the seat module or controller. Ensure the cable length is sufficient when the back angle adjustment option is activated and that the cables cannot be crushed.
3. Set the magnetic pin – micro-switch gap.

   INFORMATION A micro-switch activated by a magnetic pin (Figure 56-5) is located near the front of the lift seat. It reduces the driving speed as soon as the lift seat moves from the lower home position. The gap between the micro-switch and magnetic pin must not be more than 1 mm. It is adjusted by turning the set screw on the magnetic pin.
4. Connect the additional cable to the actuator.
5. Connect the additional cable to the controller (or seat module if applicable).
6. Install the seat back on the bearing plate (see Section 6.10.1).
7. Fully assemble the seat with side panels, footrests etc.
8. Program the control unit.

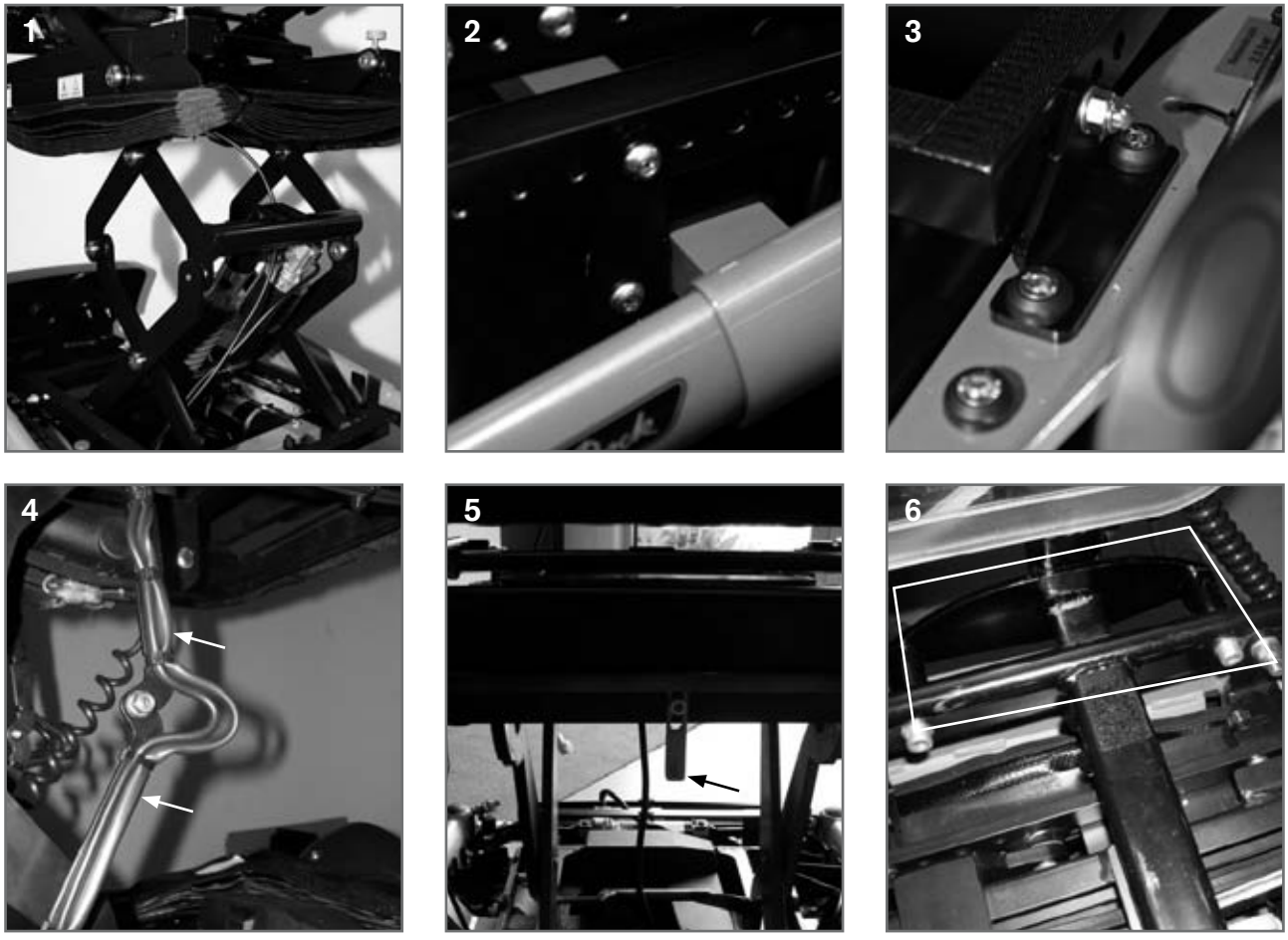


Figure 56 Retrofitting the lift seat

6.12.4 Retrofitting Electric Footrests *(Option)*

The electric footrests are delivered as a preassembled unit (knee pads optional). The footrests of the B600 power wheelchair are self-contacting.

Preparation:

❒ Remove the standard footrests and footrest adapters.

Tools:

❒ Allen wrench, size 5

❒ Open-end or combination wrench, size 13

Steps:

1. Insert the footrest adapters for the electric footrests into the seat frame and screw them into place (Figure 57-1).
2. Insert the electric footrests into the footrest adapters until they lock in place (Figure 57-2): The footrests / footrest adapters are self-contacting).
3. Fasten the additional cables to the frame with cable ties to prevent them from extending into the adjustment range.

   INFORMATION Ensure the cable length is sufficient when the footrest option is activated and that the cables cannot be crushed.
4. Connect the additional cable to the actuator.
5. Connect the additional cable to the controller (or seat module if applicable).
6. Program the control unit.

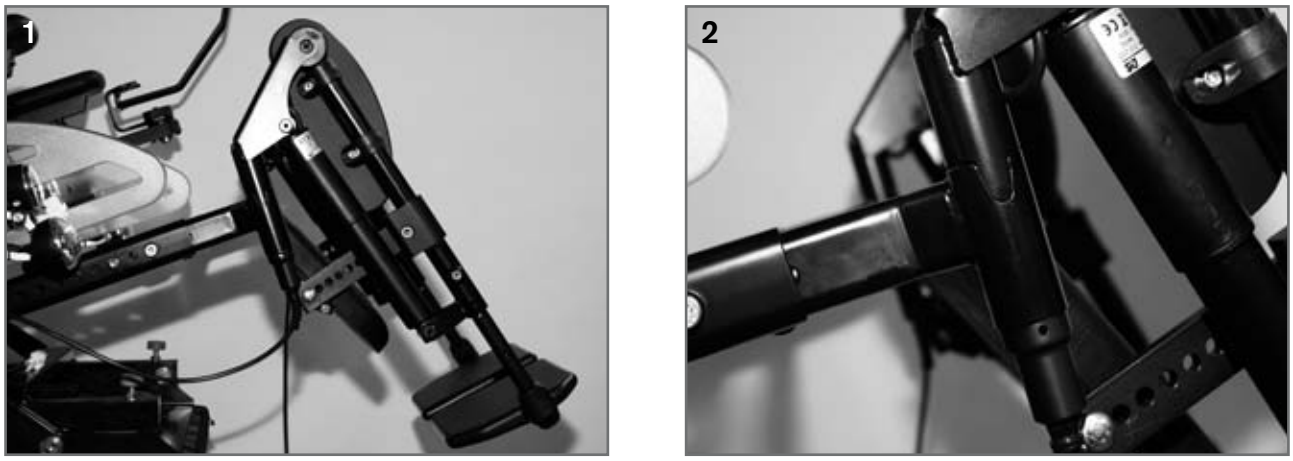


Figure 57 Retrofitting electric footrests

6.12.5 Retrofitting the Seat Module *(when required)*

INFORMATION

For information on connecting the seat module, please see Section 8.3.

Controlling more than three electric seat functions requires the installation of a seat module. The seat module should be installed on a metal brace below the seat (included in the scope of delivery).

Tools:

❒ Allen wrench, size 3

❒ Open-end or combination wrench, size 8

Steps:

1. Remove the seat / seat plate.
2. Install the seat module on the metal brace (Figure 58-1).
3. Screw the metal brace in place using oval head screws / self-locking nuts (Figure 58-2).
4. Install and connect the seat module cables (for connections, please see Section 8.3).

Figure 58 Retrofitting the seat module

6.13 Replacing the Frame

NOTICE

Risk of damage due to improper preparation of maintenance tasks. Turn off the B600 power wheelchair prior to performing any work on the frame. Secure the product to prevent it from tipping over or falling, e.g. off the workbench.

NOTICE

Risk of cable damage while cutting. During installation, take note of the cables attached to the frame, seat and drive unit sustainer using cable ties. Carefully cut the cable ties with side-cutting pliers or a knife without damaging the cables.

The frame of the B600 power wheelchair is set on top of the drive unit sustainer.

Tools:

❒ Allen wrenches, sizes 3, 4, 5, 6, 7

❒ Open-end or combination wrenches, sizes 8, 13

❒ Phillips screwdriver

Steps:

1. Unscrew all components attached to the frame:
    a. Side trim components (left / right): Loosen the mounting screws.
    b. Bumper: Loosen the screws on the drive unit sustainer.
    c. Rear covering (see Section 6.9.1).
    d. Lighting (see Section 6.9).
    e. Brake / brake release (see Section 6.8.1).
    f. Remove cable ties / cabling.
    g. Remove the caster fork (see Section 6.7.8).
2. Loosen the seat brackets / adjustment brackets of the seating unit on each side of the frame and remove them.
3. Remove the frame from the drive unit sustainer:
    a. Rear: Loosen 4 x hexagon head screws.
    b. Front: Loosen 2 x hexagon head screws.
4. Remove the frame and replace if required.

Properly reassemble all components upon completion of the work.

6.14 Replacing the Drive Unit Sustainer

⚠ CAUTION

Risk of injury due to electric current. Turn off the B600 power wheelchair prior to performing any work on the drive unit sustainers, and disconnect all plug connections between the drive unit sustainer and frame. Before removing the motors, disconnect the brake release wires.

⚠ CAUTION

Risk of injury during tasks that involve lifting. Some components, e.g. the batteries, frame, seat and motors, are very heavy. When removing or installing such components, ensure they are lifted in an ergonomically correct manner. Hoisting devices of sufficient capacity must be used where applicable.

Tools:

❒ Allen wrench, size 5

❒ Allen wrench, size 6

Steps:

1. Remove the seat including seat frame (see Section 6.10).
2. Remove the lighting (see Section 6.9).

3. Remove all components attached to the frame and drive unit sustainer:
   - Battery case (see Section 6.3.4)
   - Controller (see Section 6.4)
   - Side panels (see Section 6.5)
   - Footrests (see Section 6.6)
   - Wheels (see Section 6.7)
   - Brake release (see Section 6.8.1)
   - Trim components / bumper (see Section 6.13)
   - Motors (see Section 6.15)
   - Anti-tipper (see Section 6.16)
   - Bumper bar (6.19.2)

Properly reassemble all components upon completion of the work.

INFORMATION Static electricity caused by factors such as friction may lead to electrostatic discharge (high voltage with low current) upon contact with the wheelchair; however, this does not represent a health hazard. Since this may impair comfort, it can be prevented by mounting a ground strap on the drive unit sustainer / wheelchair frame.

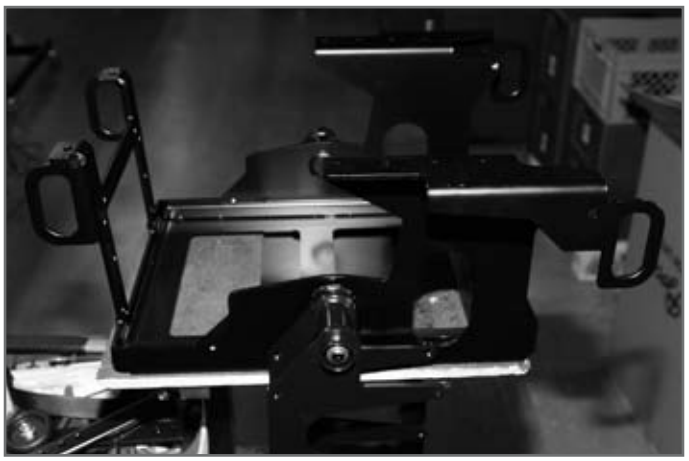


Figure 59 Drive unit sustainer, removed

6.15 Replacing the Drive Motor

⚠ CAUTION

Risk of injury due to electric current. Turn off the control unit of the B600 power wheelchair and disconnect all plug connections to the control unit / power module before performing any work on the drive motors.

Preparation:

❒ Remove the drive wheel (see Section 6.7.3).

❒ Remove the splash guard (see Section 6.7.6).

❒ Loosen the Bowden cable on the drive motor (see Section 6.8.1).

Tools:

❒ Allen wrench, size 6

Steps:

1. Disconnect the motor connection on the controller.
2. Loosen the four Allen head screws (see Figure 60, identified with arrows).
3. Remove the motor and replace if required.

Properly reassemble all components upon completion of the work.

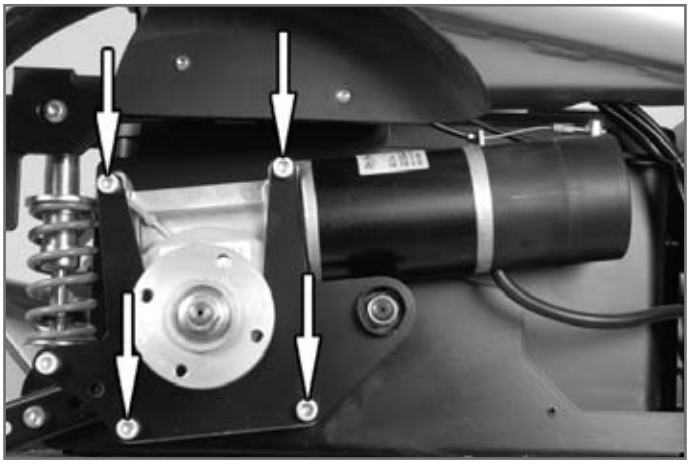


Figure 60 Replacing the drive motor

6.16 Installing the Anti-Tipper

The anti-tipper for the B600 power wheelchair may only be used as a pair (one on the left, one on the right).

Tools:

❒ Allen wrench, size 5

❒ Open-end or combination wrench, size 13

Steps:

1. Attach each anti-tipper to the drive unit sustainer with two Allen head screws.

Figure 61 Installing the anti-tipper

6.17 Replacing the Oscillating Crank

INFORMATION

When attaching the motors to the oscillating cranks, be sure to tighten the bottom screws first.

Each motor is attached to the oscillating cranks with four Allen head screws. The oscillating cranks are attached to the drive unit sustainer with one screw each.

Preparation:

❒ Remove the drive motor (see Section 6.15).

Tools:

❒ Socket, size 19

❒ Allen wrench, size 6

Steps:

1. Loosen the hexagon nut.
2. Remove the oscillating crank and replace if required.

Properly reassemble all components upon completion of the work.

Figure 62 Replacing the oscillating cranks

6.18 Replacing / Retrofitting Control Elements

6.18.1 Installing the LCD Monitor

INFORMATION

Additional information and operating instructions for the LCD monitor are contained in a separate manual.

A separate LCD monitor with infrared and Bluetooth (optional) is available to operate special controls and for environment control functions. It is mounted on the arm rest on the opposite side from the control panel.

Tools:

❒ Allen wrench, size 2

Steps:

1. Slide the square tube for the holder adapter onto the attachment rail below the arm rest (applies to standard holder, height and / or laterally adjustable holder, swan neck holder).
2. Slide the holder onto the square tube and secure it with set screws.
3. Secure the square tube.
4. Connect the LCD monitor to the controller.
5. Complete a function test (for information on menus, see the enAble50 instructions for use).

Figure 63 Installing the LCD monitor (standard holder)

6.18.2 Replacing the Control Panel

Tools:

❒ Phillips screwdriver

Steps:

1. Loosen the four Phillips screws on the holder.
2. Remove the control panel and replace if required.

Properly reassemble all components upon completion of the work.

6.18.3 Replacing the Control Panel Holder

The control panel holder for the B600 power wheelchair is clamped to the underside of the arm rest with an iron rail.

Preparation:

❒ Remove the side panel.

❒ Remove and set aside the control panel.

Tools:

❒ Allen wrench, size 3

Steps:

1. Remove the side panel from the holder.
2. Loosen the three set screws.
3. Change the position of the control panel holder, or remove the control panel holder and replace if required.

Figure 64 Replacing the control panel and holder

6.18.4 Retrofitting Attendant Controls

Standard or contour seat

Attendant controls are delivered as an installation kit. On the B600 power wheelchair with the standard or contour seat, they are attached to cross tube on the back rest. Two bore holes are provided for this purpose on the left and right of the back tube, respectively.

Tools:

❒ Allen wrench, size 4

Steps:

1. Hold the bracket for the attendant controls against the back tube.
2. Attach with two Allen head screws.
3. Attach the control panel.

Figure 65 Mounting attendant controls, standard / contour seat

Recaro® Seat

On the B600 power wheelchair with the Recaro® seat, the attendant controls are attached to the headrest.

Tools:

❒ Allen wrench, size 3

❒ Open-end or combination wrench, size 10

Steps:

1. Remove the headrest.
2. Guide the metal rods of the headrest through the two loops on the control panel holder.
3. Reattach the headrest to the seat.
4. Adjust the width of the holder with the two set screws.

6.18.5 Installing Joystick Accessories

Tools:

❒ Allen wrench, size 6

Steps:

1. Slide off the top of the joystick.
2. Slide an accessory such as the fork for tetraplegics, golf ball, stick etc. onto the metal pin.
3. Mount the accessory by tightening the set screw.

Figure 66 Installing joystick accessories

6.19 Retrofitting Accessories

6.19.1 Retrofitting Rear View Mirrors

Tools:

❒ Allen wrench, size 3

Steps:

1. Attach the rear view mirror to the track on the control panel holder.
2. Individually adjust it to user requirements by turning it manually.

Figure 67 Retrofitting rear view mirrors

6.19.2 Installing the Bumper Bar

The bumper bar is attached to the rear of the battery case.

Tools:

❒ Allen wrench, size 5

Steps:

1. Hold the bumper bar against the battery case.
2. Secure with two Allen head screws.

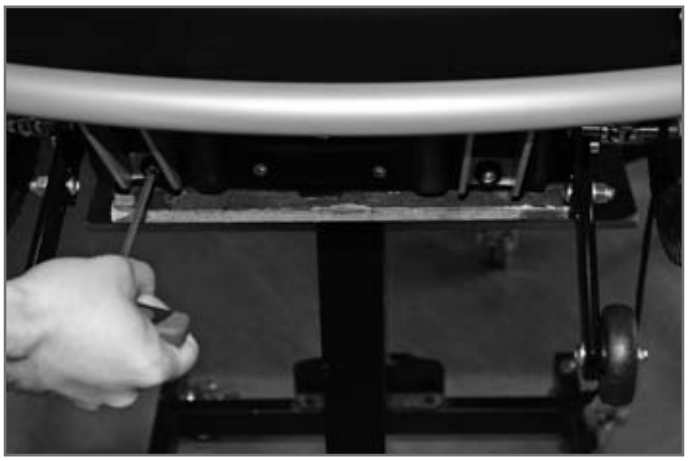


Figure 68 Installing the bumper bar

7 Error Diagnosis

NOTICE

Risk of damage due to unauthorised service. Improper or poorly executed repairs may result in the unsafe operation of the power wheelchair. The error diagnosis may therefore only be carried out by authorised dealers who have established knowledge of electronic controllers from Otto Bock.
Otto Bock will not assume any liability for damages that are due to improperly or poorly executed repairs.

INFORMATION

Experience has shown that problems with the wheelchair electrical system are frequently caused by errors and defects in the plug connections and cabling. They should be inspected first for this reason.

Errors are either shown on the control panel display / LCD monitor (see Section 7.2) or displayed using the handheld programming device. The handheld programming device (see Section 8.4) can capture errors more precisely with the help of error codes. The separate enAble50 instructions for use contain a table with error codes, causes and possible steps for resolution.

7.1 Diagnostic Steps

For an efficient and successful error diagnosis, proceed as follows:

- ❒ Verify whether the error was generated for a concrete reason or if the error was displayed sporadically.
- ❒ Check the possible causes in the error display table (see Section 7.2) or the error codes (enAble50 instructions for use). Perform the recommended checks and corrective actions.

7.2 Error Display on the Control Panel / LCD Monitor

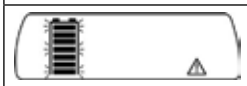
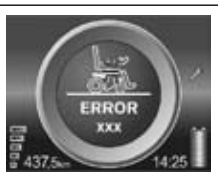
For troubleshooting purposes, the control unit of the B600 power wheelchair identifies the following categories depending on the effect of the malfunction on the system:

- ❒ Error
- ❒ Warning
- ❒ Defect

A warning indicates a status or malfunction of one or several individual components of the B600 power wheelchair.

All problems that have ever occurred are saved in a list and can be retrieved, e.g. in case of a general overhaul of the B600 power wheelchair. The saved data can be used to determine future service and maintenance intervals, for example.

The following table shows the different error messages on the control panel display or separate LCD monitor. In the LCD monitor, the error message also includes the identification number of the error that has occurred (for more detailed information see the enAble50 instructions for use (647G490=D/GB)):

Display symbol(s)	LCD monitor display	Error / warning / defect	Cause	Measures
		Controller temperature warning	Overheating due to excessive load	Cool down phase
		Motor temperature warning	Overheating due to excessive load	Cool down phase
		Motor temperature warning	Control unit has switched to creep speed due to overheating	Cool down phase
		Joystick warning	Joystick not in zero position when switching on	Bring joystick to zero position before switching on
		Hand control device fault	Defective joystick	
		Controller error	Defective controller	
		Communication error (alternating flashing signal)	Faulty connection between the hand control device and controller. Defective cabling, software or hardware	Check cabling / plug connections
		Battery under voltage	Battery deep discharge	Charge as soon as possible
		Battery over voltage	Voltage too high (after full charge and driving downhill)	Continue driving slowly
		Fault with seat tilt motor	Faulty cabling or plug connection, defective actuator	Check cabling / plug connections

Display symbol(s)	LCD monitor display	Error / warning / defect	Cause	Measures
		Back angle adjustment motor fault	Faulty cabling or plug connection, defective actuator	Check cabling / plug connections
		Lift seat motor fault		
		Drive motor fault		
		Electric footrest motor fault		
		Brake fault	Open brake release / defective brake	Close brake release; check brake (e.g. the Bowden cable)
		Emergency stop	Severe fault caused by malfunction in the controller, hand control device and / or drive motor	

Table 4 Error display

INFORMATION

The enAble50 instructions for use 647G490=D/GB include a list of error codes “WARNING XXX” and “ERROR XXX” on the LCD monitor as well as information on corrective actions.

8 enAble50 Wheelchair Controller – Installation and Programming

INFORMATION

The enAble50 instructions for use 647G490=D/GB contain more detailed information about the control unit and the connection of input devices.

8.1 Overview

The enAble50 control unit is extremely versatile, featuring smooth operation, good responsiveness and concise colour displays. Various input devices can be used alternately in order to meet the needs of users.

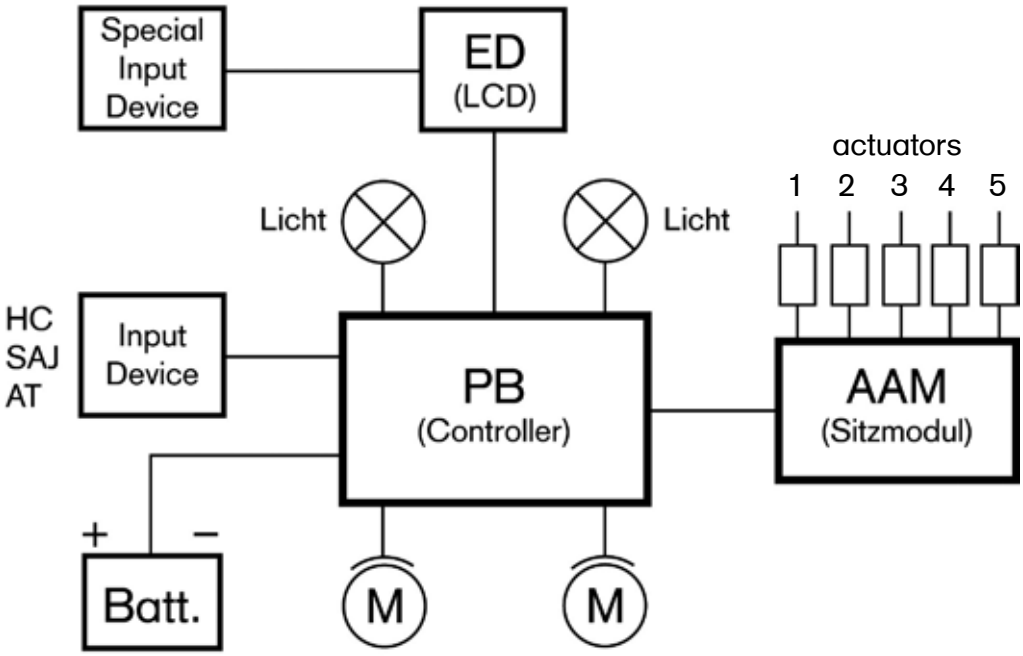


Figure 69 Control unit elements

With the enAble50 control unit, the power wheelchair can indicate the causes of error messages on the display.

Error sources in the drive section and in the electric options are indicated by flashing of the corresponding sections in the display's pictogram or a visual display on the separate LCD monitor (see Section 7.2).

The handheld programming device can be used to make parameter changes (available separately).

Figure 70 Components of the enAble50 wheelchair controller

1 Attendant control
2 Hand control device
3 Controller
4 Separate LCD monitor

8.2 Controller

The controller is attached to the wheelchair with two screws (see Section 6.4).

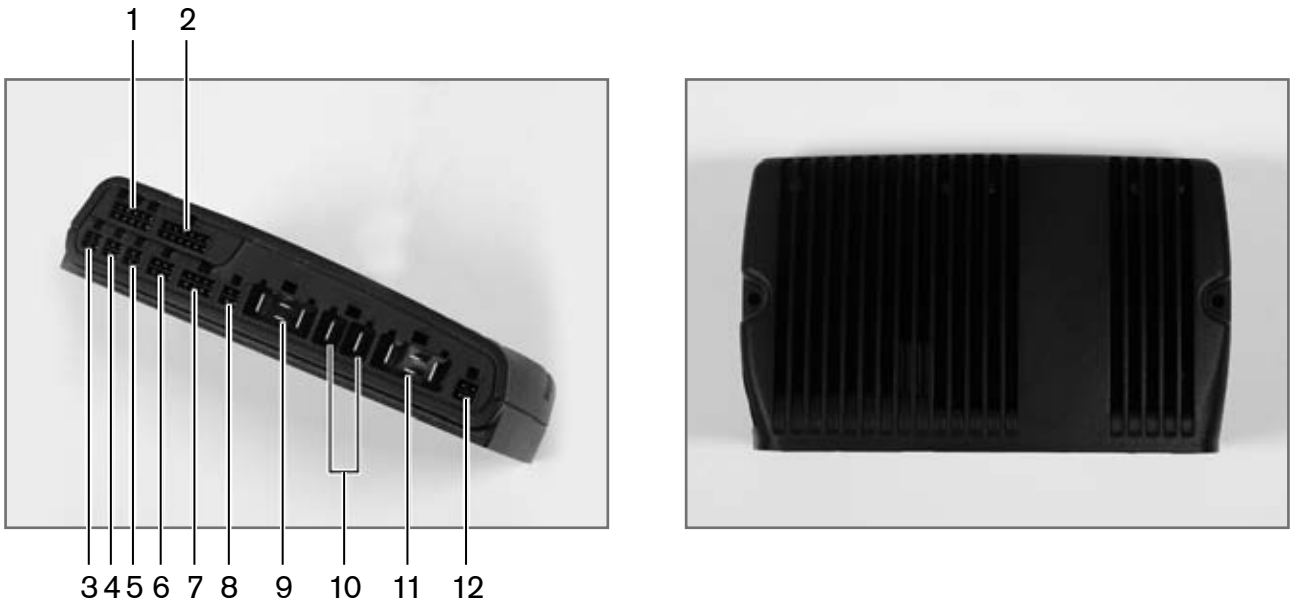


Figure 71 Controller

1 J8 – Actuator 1/2 and driver outputs
2 J9 – Lighting connection
3 J1 – Analogue input connector
4 J2 – Analogue input connector
5 J3 – Analogue input connector
6 J4 – BUS connector
7 J5 – BUS and charger inhibit connector
8 J6 – Encoder / switch connector
9 M1 – Motor 1 connector
10 BATT – Battery connector
11 M2 – Motor 2 connector
12 J7 – Encoder / switch connector

The housing heats up during high-current operation. Therefore, installing the controller on a metal surface with sufficient clearance for air circulation around the housing is recommended. This transfers heat away from the device, improving performance and increasing the lifespan of the controller.

8.2.1 Wiring the Controller

The illustration below shows the wiring of the enAble50 controller for a system that has drive motors equipped with encoders.

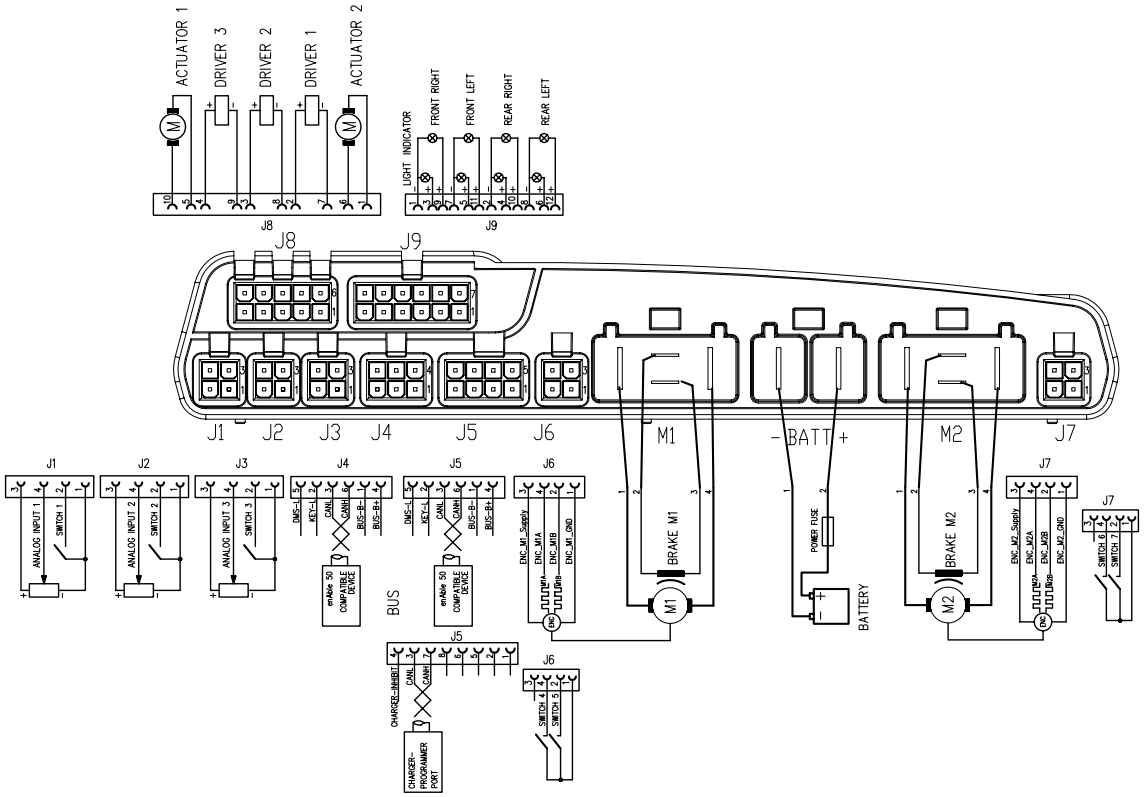


Figure 72 Controller connection schematic

8.2.2 Technical Data, Connections

	Wire gauge	Mating force
M1, M2: Motors	2.5 – 4 mm²	40 Nm
M1, M2: Brake	0.5 – 1 mm²	18 Nm
Battery	2.5 – 4 mm²	40 Nm
J4 (bus), J9 (12-pin)	0.5 – 1 mm²	1.5 kg

8.2.3 Actuator Outputs

The controller has two independent actuator outputs.

Technical data for the first actuator output:

Voltage	0…100 % V_{Batt}
Current for 20 seconds	20 A
Steady current	10 A

Technical data for the second actuator output:

Voltage	0…100 % V_{Batt}
Current for 20 seconds	15 A
Steady current	7 A

The actuator outputs are short-circuit protected. However, short-circuiting the actuator output against the negative pole of the battery while the actuator is in operation may damage the output. The actuators have high impedance when they are not in operation.

8.3 Seat Module

The controller is attached to the wheelchair with two screws and can be aligned in any position (see Section 6.12.5).

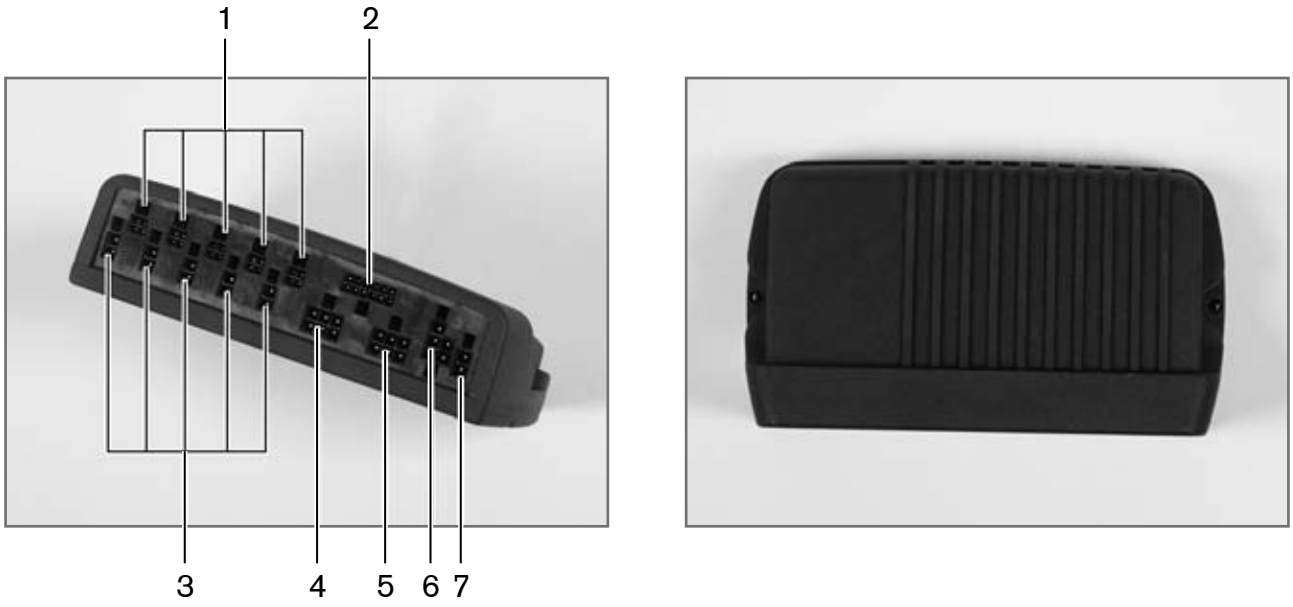


Figure 73 Seat module connection schemata

1 IN-A, IN-B, IN-C, IN-D, IN-E connections
2 RSW
3 A1 - A5 connections (actuators A1 - A5)
4 BUS connection
5 BUS connection
6 BATT bridge / external supply connection
7 12 V DC (connection must be activated by parameter -> On/Off!)

8.3.1 Wiring the Seat Module

The illustration below shows how to wire the seat module. The battery connector either has to be connected to the bus (using a 2-pole bridge, see Figure 75-1) or directly to the battery (using the 4-pole plug, see Figure 75-2). If the seat module is connected directly to the battery, you may also use the battery to supply higher loads.

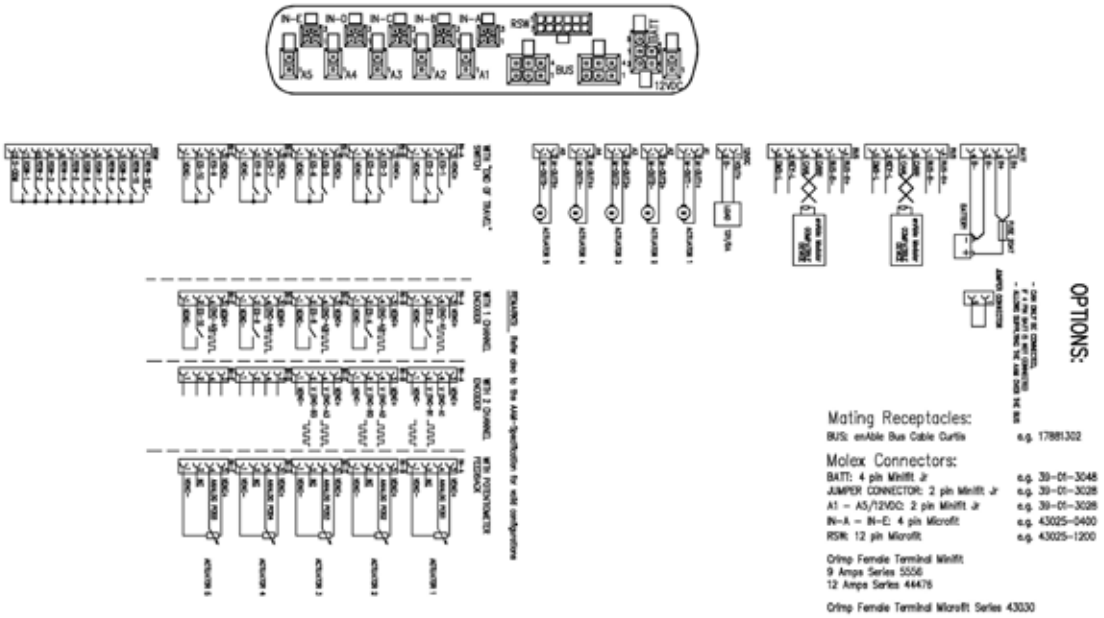


Figure 74 Seat module connection schemata

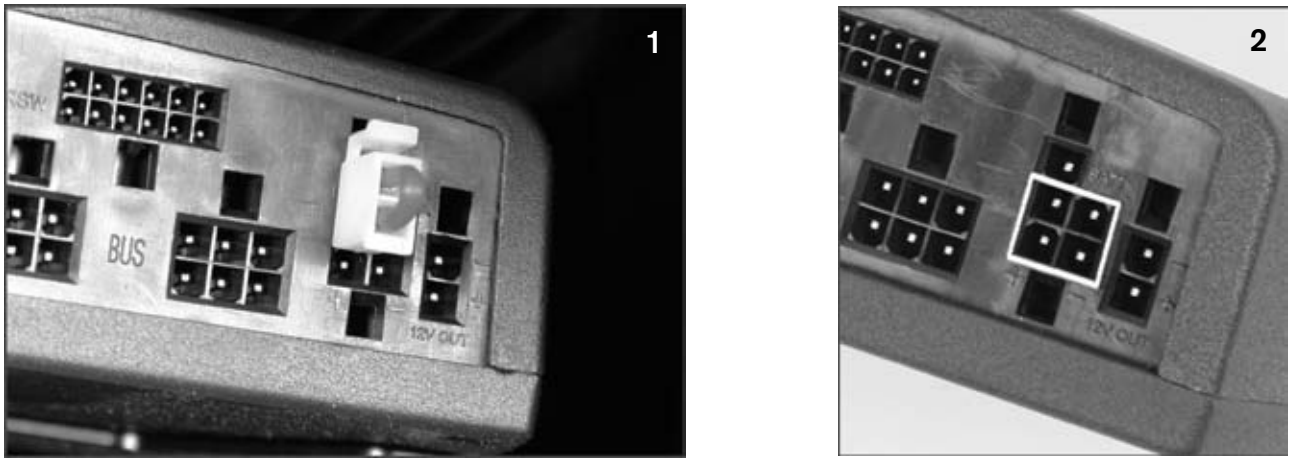


Figure. 75: Battery connection for power supply

8.3.2 Electrical Data

Power supply:

Operating voltage	16 – 33 V
Power supply via bus	12 A
Power supply direct from the battery (continuous)	18 A
Power supply direct from the battery (3 seconds)	24 A
Standby current (typical)	4 mA

Table 6 Power supply

A 2-pin bridge between poles 1 and 5 of the battery connector is required for the power supply of the seat module via the bus. If more current is required, the seat module can be wired directly to the battery (poles 1–4). In this case a fuse must be installed as shown in the wiring diagram.

Actuator outputs (A1–A5):

All five actuators can operate forwards or backwards independently in a speed range from 0 to 100%.

Nominal current [1]	
For 1 second	25 A
For 10 seconds	15 A
Continuous (maximum)	10 A [2]

1) Data apply when only one of the actuators is in operation.
2) This nominal current depends on the seat module installation.

- ❒ Up to 5 actuators may be operated simultaneously. The total current is not permitted to exceed the maximum supply current of 18 A.
- ❒ Each actuator is short-circuit protected (M+ to M-). There is no protection against incorrect wiring between battery B+ or B- and the actuator connector, so that the module could be destroyed in this case.
- ❒ The absolute current limit of the actuators can be set by a parameter. This parameter applies to all actuators.
- ❒ The actuator outputs have high impedance when they are not in operation.

INFORMATION

The enAble50 instructions for use 647G490=D/GB contain information on the power supply and actuator connectors.

8.4 Programming Devices

The enAble50 control unit is programmable, e.g. the settings for the various programmable parameters can be set using a programming device. Two programming devices are available: A handheld programming device and a PC programming station (PCPS). The PCPS has additional functions not offered by the handheld programming device. On the other hand, the handheld programming device is more portable. The PCPS is usually used to establish the initial parameter settings, while the handheld programming device is used for changes after deployment.

8.4.1 Handheld Programming Device

The handheld programming device (493U36=SK180) is designed for programming, inspection and debugging of the wheelchair modular control system (MCS).

Figure 76 Handheld programming device

Control and display elements:

1. **LCD:** Graphic display (128 x 64 pixels) to display functions and parameters.
2. **Cross navigation key:** A control element to navigate the cursor in the menu tree. Press the up / down arrow to move the cursor vertically in the menu tree. Press the right hand arrow at the branch points to open the corresponding sub-functions and press the left hand arrow to closes these sub-functions again.
3. **Toggle switch:** This control element is used to increase or decrease the selected parameter values.
4. **Programmable bookmarks:** 3 user-defined bookmarks. This function enables you to jump quickly among various points in the menu tree. To set a bookmark, select an item and press the key for a longer time (at least 3 seconds). Then the cursor will jump to the predefined position by pressing the key quickly.

Initial operation:

1. Turn on the wheelchair control.
2. Ensure the cable is securely connected to the handheld programming device.
3. Connect the bus plug of the handheld programming device to a free bus receptacle (e.g. on the bottom of the display module).

Operation:

a) Display

The interface is displayed using a so-called “menu tree”. The displayed menu tree range may consist of up to 7 lines. The selected function is indicated by a blinking box. The menu tree branches into several levels, with the lowest level containing individual parameters with numerical values displayed on the far right.

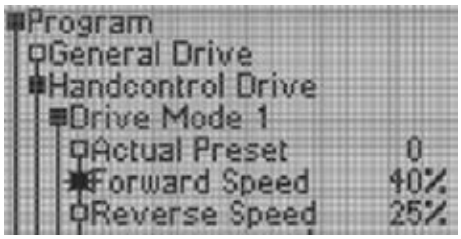


Figure 77 Menu tree

For easier navigation of the selected branch in the menu tree, the display includes nodes (rectangles). They are connected with lines to indicate the relationship between items on the same level in the vertical direction and the depth of branching in the horizontal direction.

The selected branch is indicated with a solid node, while the currently selected function is indicated by a blinking node.

b) Main menu

The main menu of the handheld programming device contains 5 main items.

In the “Program” menu item, the parameters of individual modules can be changed.

“Monitor” allows you to display the current module status and parameters. The status of the control elements, battery voltage and battery capacity, motor current and voltage during operation as well as other important module data can be used for system analysis.

For debugging purposes, the errors are stored in fault history for the individual modules. In addition to a brief description, the error type, error code, line number and time stamp are stored for evaluation. For the controller, error statistics are be created to register the number of detected errors. The error history can be cleared after evaluation or when repairs are completed. All current errors are displayed by the system error monitor. This allows current problems to be identified quickly.

Device data for the individual modules are recorded in the “Information” submenu. This includes the model number, serial number, software and hardware version etc.

The last main menu item contains the device settings for the handheld programming device. This is where you can change the language and contrast settings in addition to reading device errors that have occurred.

c) Changing values

Navigate through the menu tree by moving the blinking cursor using the four-directional button. The respective sublevel can be opened by using the right button in each node until you reach the parameter value level. Parameters can be increased or decreased by pressing the plus or minus symbol on the toggle switch. By pressing the toggle switch briefly, the values are changed by small increments; keeping the toggle switch depressed for a longer time changes the values by larger increments.

The following list shows the programmable wheelchair parameters.

The monitor values, list of individual module errors, subitem information and the settings for the handheld programming device are not listed individually here. However, they are easily viewed on the handheld programming device thanks to the uniform menus.

INFORMATION

Ensure that the freely accessible parameter for the standard LCD contrast (default value 130) is not changed, because the value quickly leaves the defined range and the font can no longer be distinguished from the background. In that case the handheld programming device must be reset using a PC program.

8.4.2 PC Programming Station (PCPS)

The enAble50 control unit can also be programmed with the PCPS 1314 programming station. In addition to the programming software, an interface is required to connect the computer and control unit. An adapter is required to programme the enAble50 wheelchair control unit. Article no. 493U32=SK185 includes the programming software, interface and adapter cable.

INFORMATION

For more information on using the software, please consult the enAble50 instructions for use.

8.5 Programmable Parameters

⚠ WARNING

Risk of accidents and injury due to incorrect configuration settings. Modified parameter settings in the configuration can lead to changes in driving characteristics. In particular, changes to the speed, acceleration, braking or joystick settings can lead to unexpected and therefore uncontrollable operating performance with a risk of accidents. Always test the driving characteristics of the power wheelchair after configuration / programming is complete.
Programming must only be completed by authorised personnel. Neither Otto Bock nor the control unit manufacturer are liable for damages (especially in combination with special controls) caused by programming that was not properly / professionally adapted to the abilities of the wheelchair user.

The enAble50 wheelchair control unit includes a number of parameters that can be programmed using the handheld programming device or the PCPS 1314 (see Section 8.4). These programmable parameters allow the driving characteristics and performance of the vehicle to be adapted to special user requirements. Information about the use of the handheld programming device can be found in Section 8.4.1.

8.5.1 Main Parameters

The menu tree is divided into the following three main parameters:

❒ Input devices

❒ system settings

❒ configuration.

Main Parameters	Menu	Submenu	Settings
Input devices	Hand control device settings	Basic setting	5 adaptable profiles: – Speed – Responsiveness – Mode All driving parameters refer to operation with the hand control device.
		Driving	All parameters that affect driving are listed here. More information on the individual parameters is found in Section 8.5.2.
		Starting point	When the system is powered up, it starts at the following point: – Main menu – Favourites – Most recent driving mode – Driving (mode 1 - 5)
		Joystick	More information on the individual parameters is found in Section 8.5.3.
		Tone & display	– Command tone – Background light – Dim delay – Tone frequency – Horn frequency
		Miscellaneous	– On/Off switch monitor – Switch monitor mode – Switch delay mode – Receptacle mode – Navigation mode menu – Menu delay
	Joystick module	Basic setting	All parameters are equivalent to those for the hand control device. The parameters do not refer to the standard hand control device, but to the stand-alone joystick (attendant control).
		Driving	
		Joystick	
		Miscellaneous	
	Special input	Basic setting	All parameters are equivalent to those for the hand control device. The parameters do not refer to the standard hand control device, but to input devices such as the mini joystick or 1-5 button input (special input device).
		Driving	
		Settings	
		Miscellaneous	

Main Parameters	Menu	Submenu	Settings
System settings	Driving – general	Maximum speed	The maximum speed parameter forms another layer above the speed values that can be programmed under input devices. Example: Max. speed = 60%. Forward speed = 80%. In driving mode 1, 0.8 x 60% = 48% of the normal driving speed.
		Maximum RPM	Limits the maximum RPM.
		Quick stop factor forward	Factor that determines the delay, e.g. if the joystick is released while driving.
		Quick stop factor reverse	
		Emergency brake	Factor that determines the delay in case of problems in the control unit, e.g. the wheelchair is turned off while driving.
		Forward tracking	Compensates for speed differences between the right-hand and left-hand motor. Directional stability can be improved.
		Reverse tracking	
		V steering limit	Determines speed changes in curves.
		Navigation button mode	Defines whether long or short mode signals have different meanings.
		Profile increase stop	Profile change
	Emergency operation		All driving parameters if the wheelchair is in an emergency situation (creep speed).
	Wheelchair geometry		Parameters that relate to the wheelchair base frame, e.g. wheelbase. These parameters should not be changed.
	Reverse operation audio signal		A warning signal can be emitted during reverse operation. It can be activated or deactivated in individual profiles.

Main Parameters	Menu	Submenu	Settings
	Delays		Various delays can be programmed.
		Automatic shutoff	The wheelchair turns off after the established delay. It does not shut down if the setting is 0.
		Stop timeout	After the delay specified here, the wheelchair switches from cruise control operation to normal operation.
		Stop timeout deactivated	Specifies whether the cruise control automatically stops after the stop timeout or not.
		Driving timeout	Delay between the last driving command and automatically switching to the prior mode. No switching if the parameter is set to 0.
		Aux timeout	Delay between the last input command and automatically switching to the prior operating mode. No switching if the parameter is set to 0.
		Menu timeout	Defines the command delay for menu operation.
		IR function timeout	Delay before the IR menu jumps up one level. No jump if the parameter is set to 0.
	Motor & wheels		Parameters that adapt the drive motors to the controller. The direction of rotation can be changed.
	Seat	Actuators 1 to 5	Parameters to adjust the seat actuators (speed, current). The seat module offers a separate 12 volt output. The voltage can be turned on or off under the “Miscellaneous” menu item.
	Extended display with Bluetooth	Tone & display	The display is needed to control external devices using infrared. Bluetooth can only be used to control a computer mouse. Bluetooth must be activated first.
		Mouse	
		Remote control	
	Brake		Parameters that establish when the brakes engage and disengage.
	Actuators & steering	Actuators	2 actuators can be connected to the controller. For example, speed and current values can be programmed here.
		Steering motor	
	Driver outputs	J1	J1-J3 sind programmierbare Ausgänge, die jeweils mit 2 A belastbar sind und auf Batterie + gesetzt werden. Programmierbar sind: – externe Hupe: Ausgang schaltet bei Hupfunktion. – Ventilator: Ausgang schaltet bei Erreichen der programmierten Kontrollertemperatur. – Überspannung: Ausgang schaltet bei Überschreitung einer programmierbaren Spannung. – Rückwärtsfahrt: Ausgang schaltet bei Rückwärtsfahrt. – System ein: Ausgang schaltet, wenn das System eingeschaltet ist.
		J2	
		J3	
	Light		Parameter for light and direction indicator settings.
	Battery		Parameters for battery settings, which are very time-consuming to establish. The default settings should be retained.
	Odometer reset		Daily and total odometer readings can be reset.
	Hour meter reset		Resets the hours of operation for the drive motors.

Main Parameters	Menu	Submenu	Settings
	Drive-away lock		Turns the drive-away lock function on / off. The lock is activated when the mode button is pushed and held for approximately 5 seconds or the corresponding menu item is selected from the auxiliary menu. However, the mode button cannot be used in this manner if the “smart button” parameter is activated, since the long mode command is used to shut down the system in this case. Value: On / off.
Configuration	Save system configuration		Saves the system configuration with all modules and checks whether all modules are present.
	Remote control		The menu tree for the extended display with Bluetooth (LCD) can be set up here. The structure is customisable.
	Seat	Actuator configuration	The existing seat actuators (functions) are assigned to the outputs in the seat module. Possible limitations can be programmed via limit switches.
	Actuators & steering		The controller actuators can be configured here. Very important setting that establishes the respective wheelchair model. The steering is defined. 2 additional standard actuators can be programmed with normal steering, e.g. for the tilt function or back rest. Possible limitations can be programmed via limit switches.

Table 5 Main Parameter Settings

8.5.2 “Driving” parameter settings

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Driving > Profile 1 P1 > Forward speed. VorG	Service	5	100	20	%	Maximum forward driving speed Determines the highest possible forward driving speed at full deflection when the position of the potentiometer is set to maximum. If the position of the potentiometer is between minimum and maximum, the highest possible forward driving speed is adjusted linearly. Ensure the user can operate the wheelchair safely at maximum speed.
Input devices > Hand control device settings > Driving > Profile 1 P1 > Reverse speed. RückG	Service	5	100	20	%	Maximum reverse driving speed Determines the highest possible reverse driving speed at full deflection when the position of the potentiometer is set to maximum. If the position of the potentiometer is between minimum and maximum, the highest possible reverse driving speed is adjusted linearly. Ensure the user can operate the wheelchair safely at maximum speed.
Input devices > Hand control device settings > Driving > Profile 1 P1 > Turning speed. DrehG	Service	5	100	10	%	Maximum turning speed Determines the highest possible turning driving speed at full deflection when the position of the potentiometer is set to maximum. The turning speed is normally set to a much lower value than the forward driving speed. If the position of the potentiometer is between minimum and maximum, the highest possible turning speed is adjusted linearly. Ensure the user can operate the wheelchair safely at the selected speed.

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Driving > Profile 1 P1 > Forward acceleration. VorB	Service	5	100	20	%	Maximum forward acceleration Specifies the forward acceleration of the wheelchair when the position of the potentiometer is set to maximum. A high value represents a short acceleration time and a fast start. High acceleration values result in abrupt speed changes and should only be used in special cases. If the position of the potentiometer is between minimum and maximum, the forward acceleration is adjusted linearly. Ensure the user can operate the wheelchair safely at maximum acceleration.
Input devices > Hand control device settings > Driving > Profile 1 P1 > Forward delay. VorV	Service	5	100	20	%	Maximum forward delay Specifies the forward delay of the wheelchair when the position of the potentiometer is set to maximum. A high value represents a short delay time and a rapid stop. High delay values result in abrupt speed changes and should only be used in special cases. If the position of the potentiometer is between minimum and maximum, the delay is adjusted linearly. Ensure the user can operate the wheelchair safely at maximum delay.
Input devices > Hand control device settings > Driving > Profile 1 P1 > Reverse acceleration. RückB	Service	5	100	20	%	Maximum reverse acceleration Specifies the reverse acceleration of the wheelchair when the position of the potentiometer is set to maximum. A high value represents a short acceleration time and a fast start. High acceleration values result in abrupt speed changes and should only be used in special cases. If the position of the potentiometer is between minimum and maximum, the reverse acceleration is adjusted linearly. Ensure the user can operate the wheelchair safely at maximum acceleration.

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Driving > Profile 1 P1 > Reverse delay. VorV	Service	5	100	20	%	Maximum reverse acceleration Specifies the reverse delay of the wheelchair when the position of the potentiometer is set to maximum. A high value represents a short delay time and a rapid stop. High delay values result in abrupt speed changes and should only be used in special cases. If the position of the potentiometer is between minimum and maximum, the reverse delay is adjusted linearly. Ensure the user can operate the wheelchair safely at maximum delay.
Input devices > Hand control device settings > Driving > Profile 1 P1 > Turning acceleration. DrehB	Service	5	100	10	%	Maximum turning acceleration Specifies the turning acceleration of the wheelchair when the position of the potentiometer is set to maximum. A high value represents higher turning acceleration and more rapid direction changes. High turning acceleration values result in abrupt direction changes and should only be used in special cases. If the position of the potentiometer is between minimum and maximum, the turning acceleration is adjusted linearly. Ensure the user can operate the wheelchair safely at maximum acceleration.
Input devices > Hand control device settings > Driving > Profile 1 P1 > Turning delay. DrehV	Service	5	100	10	%	Maximum turning delay Specifies the turning delay of the wheelchair when the position of the potentiometer is set to maximum. A high value represents higher turning delay and more rapid direction changes. High turning delay values result in abrupt direction changes and should only be used in special cases. If the position of the potentiometer is between minimum and maximum, the turning acceleration is adjusted linearly. Ensure the user can operate the wheelchair safely at maximum delay.

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Driving > Profile 1 P1 > Forward stop. HaltV	Service	0	2	0		Constant speed forward / reverse If 'Constant speed' = cruise is selected, the wheelchair accelerates to the desired speed. If the command is reduced, the wheelchair maintains speed. Direction changes are always possible. The wheelchair decelerates if an opposing command of 50% or less is issued. A stop is achieved via a mode button command or an opposing command of more than 50%. If 'Constant speed' = stepped is selected, the wheelchair accelerates by one increment with each short command (33%, 66% and 100%) up to the maximum speed. Direction changes are always possible. The wheelchair decelerates by one increment (e.g. from 66% to 33%) when a brief opposing command of 50% is issued. A stop is achieved via a mode switch or with a permanent opposing command. ⚠ WARNING **Risk of injury due to incorrectly installed control buttons.** Never select 'Constant speed' mode (cruise or stepped) unless the mode button is installed so that the user can operate it quickly at any time.

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Driving > Profile 1 P1 > Reverse stop. HaltR	Service	0	2	0		Constant speed forward / reverse If 'Constant speed' = cruise is selected, the wheelchair accelerates to the desired speed. If the command is reduced, the wheelchair maintains speed. Direction changes are always possible. The wheelchair decelerates if an opposing command of 50% or less is issued. A stop is achieved via a mode button command or an opposing command of more than 50%. If 'Constant speed' = stepped is selected, the wheelchair accelerates by one increment with each short command (33%, 66% and 100%) up to the maximum speed. Direction changes are always possible. The wheelchair decelerates by one increment (e.g. from 66% to 33%) when a brief opposing command of 50% is issued. A stop is achieved via a mode switch or with a permanent opposing command. ⚠ WARNING **Risk of injury due to incorrectly installed control buttons.** Never select 'Constant speed' mode (cruise or stepped) unless the mode button is installed so that the user can operate it quickly at any time.
Input devices > Hand control device settings > Driving > Profile 1 P1 > Performance Performance	Service	20	100	100	%	Performance The performance parameter may be less than 100% to limit the maximum torque. Limiting the torque reduces the power of the wheelchair. This can prevent dangerous collisions or crossing obstacles. Reducing torque is usually only feasible for indoor operation. After reducing the torque, ensure the user is able to cross any obstacles that need to be crossed.

Table 6 "Driving" parameter settings

8.5.3 “Joystick” Parameter Settings

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Joystick > Dead band operation	Service	10	50	20	%	Centre dead band Centre dead band defines the joystick travel before the system recognises the command. The value corresponds to a circle around the joystick zero point. No movements or commands are executed unless the joystick is moved beyond this circle. Increasing this value is useful if the operator has a pronounced hand tremor.
Input devices > Hand control device settings > Joystick > Switch operation	Service	Off	On	Off	On/ Off	Switch function The joystick can be used like a switch. If the switch function is ON, the proportional function is replaced by a switch function. Moving the joystick from the centre by more than 50% generates a 100% command in the desired direction.
Input devices > Hand control device settings > Joystick > Tremor suppression	Service	0	100	0	%	Suppresses a tremor on the joystick. 0 % -> Tremor suppression deactivated 100 % -> Maximum tremor suppression INFORMATION If a brief command is used for system operation (e.g. if “3 direction profile” is selected), tremor suppression should not exceed 90%. If tremor suppression exceeds 90% in such a case, the brief command is ignored.

Table 7 “Joystick” parameter settings

9 Maintenance and Service Plan B600

Customer:

Re-use

Yes	No

Year of manufacture:	Serial no.:

B600 General Condition

Driving report:

Areas

Check the functionality, settings, damage or deformation and screw connections for all components listed here!

		OK	Damage	Replacement
1	**Control unit**			
	Control unit holder			
	Control cable			
	LCD monitor (if present)			
2	**Battery case**			
	Batteries			
	Wiring			
3	**Motors**			
	Brake release			
4	**Tyres**			
	Drive wheels			
	Steering casters			
5	**Frame**			
	Drive unit sustainer			
6	**Seat**			
	Back			
	Upholstery / cushion			

Maintenance and Service Plan B600

	Contoured seat			
	Contoured back			
	Recaro seat			
7	Electric seat adjustments			
	Back adjustment			
	Mechanical back adjustment			
	Seat tilt			
	Lift seat			
	Footrests			
8	Side panels			
	Adapters			
	Clothing protector			
	Lighting adapter			
9	Footrests			
	Adapters			
	Elevating footrest			
10	Options			
	Headlights			
	Rear lights			
	Belt			
	Curb climbing assist			
	Headrest adapter			

Comments:

The maintenance service was carried out by:	Place / date:	Signature:

Kundenservice/Customer Service

Europe

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